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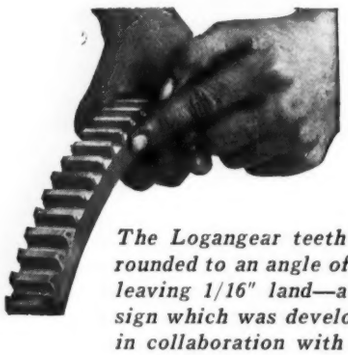

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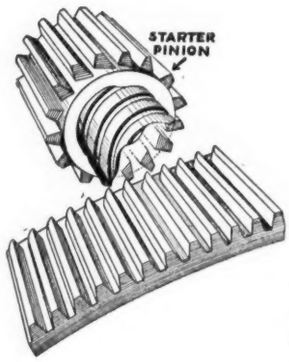

The Logangear is made of a bar of special alloy steel, shaped to a ring, heat treated and electrically welded at the joint. It has no weak point. The gear teeth are then cut to accurate pitch and given scientifically correct chamfer, which insures a perfect mesh with the starter pinion. As a final insurance against trouble the whole ring is hardened.

LOGANGEARS

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLVIII NEW YORK—THURSDAY, JUNE 14, 1923 No. 24

Sales Managers of Future Must Be Real Economists

Marketing plans will be based on actual business conditions in almost every county. Reliable reports required to tell what to expect. Additional data needed to formulate long swing policies. Interdependence of all industries must be studied.

By James Dalton

AMERICAN manufacturers will be confronted with unusually difficult problems in the months to come. Some of them can be met on the basis of past experience and some of them can't because conditions never again will be the same as they were before the war.

The automotive industry will not be immune from the effects of these problems and the sooner it gives consideration to means of meeting them the better off it will be.

All industry and trade are inter-dependent to a large degree and there are many perplexing questions common to all. There can be no real prosperity in any one industry unless all other industries are relatively prosperous.

In the order of their importance, major problems in the motor vehicle field will be concerned with:

Marketing.

Production.

More efficient marketing methods must be developed. It has been estimated that the United States can produce in seven months, under normal conditions, as much as it can consume in twelve. The balance of foreign trade is unfavorable to us for the first time in years. This means that Americans are buying abroad more than they are selling. The condition does not apply in the automotive field, but it does apply to industry as a whole.

Even though the exports of automotive products continue to increase, as they undoubtedly will, a long-continued adverse trade balance will influence domestic sales if makers of other products are unable to find outlets for all the goods they can make. The situation is easily explainable and it probably is more or less temporary.

DEPRECIATED foreign exchange has made it more profitable for other nations to sell to us and receive American dollars in payment than to buy from us and pay in currency of less value. The concentration of gold in this country also has made it cheaper for us to buy abroad than at home. A third factor has been the fact that up to this time production here has been behind domestic demand. Foreign producers have been called upon to supply the deficiency.

The warning to be found in the unfavorable trade balance is that constantly increasing production costs will make it impossible for foreign customers to buy from us and they also will retard consumption at home. This ultimately would mean serious trouble. It means that raw material prices and, to a lesser extent, wage rates should be kept as low as possible.

Manufacturers now are facing more serious problems than producers of raw materials or wholesalers and retailers. Labor is scarce and demanding higher wages. Once wages are raised it always is difficult

to bring them down, although they are not as big a factor in production costs as a good many persons seem to think.

Raw material prices are high but they will fluctuate with supply and demand. If output could be increased indefinitely or if retail prices could be raised safely, the situation would not be so difficult. But buying has fallen off to a certain extent, which makes it impossible to increase production and there is a disposition on the part of consumers to resist higher prices. This makes larger output hard to attain and radical price revisions dangerous.

Selling Costs Out of Proportion

While these conditions are general, they all work back to the automotive field and exert an influence upon it. This industry has no peer in production efficiency, but it has much to learn about efficiency in marketing methods. Its selling costs are all out of proportion to manufacturing expense. Some manufacturers admit that it costs as much to sell their products as it does to make them.

Manufacturers in the automotive field who are most successful in future will be the ones who merchandise their goods along the soundest and most scientific lines. Haphazard methods, based more or less on tradition and guesswork, must be replaced by facts and accurate data.

Sales managers must become merchandising strategists and real economists. Quotas must become flexible and they must be based on the actual business conditions, present and prospective, in the territory of every dealer. Sales must be pressed in the districts which are most prosperous and dealers must not be forced in sections where times are relatively hard.

Rotation of crops in different States must be studied and advantage taken of all the marketing periods. For example, if the peach crop in Georgia is a failure and the

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trees in Delaware bear bumper harvests, Delaware is the market to be cultivated. If the textile mills in the South are running at capacity and the textile mills in New England are not, then the textile centers of the South offer better markets than those of the North.

Statistics on population, wealth and the registration of motor cars by classes by counties are helpful, but they are not enough. Accurate knowledge of industrial and agricultural conditions in each county will have a greater influence on sales. General information about large units, such as States, is not sufficient. There may be two cities in the same State, of practically identical size and per capita wealth, one of which is prosperous and the other in the grip of comparatively hard times at the same period. This condition of relative prosperity may be reversed once or even twice in the same year.

Facts about what happened last month are easy to get. It's what's going to happen next month that counts most. No prophetic vision is needed to make an estimate. It can be based on known conditions and definite causes always bring definite results.

When a sales manager can have on the wall before him a huge county map of the United States, stuck full of pins of different colors denoting various business conditions, he can tell almost at a glance where sales should be pushed, provided the pins are changed at least once a week and the color of them is determined by definite information of unassailable accuracy.

The old theory that a distributor or dealer should take each month a stated number of cars or trucks, with the quota fixed arbitrarily at the beginning of each year, is rapidly passing. When a sales manager possesses the requisite amount of fact data about the sales possibilities in the territory of each dealer, monthly quotas can be enlarged or reduced on a scientific basis.

The ablest sales managers will be the keenest students of crop reports and employment figures. They will know in just what sections the cotton, corn and wheat crops promise to be best and in just what cities the sales outlook is most promising.

Knowledge of National Conditions

When they talk about cotton in Georgia, for instance, they will know the exact situation in the southern, central and northern sections of the State. When they consider New York State they will know what conditions are in Albany, Troy, Schenectady, Utica, Syracuse, Rochester and Buffalo. The textile mills in Utica and Troy may be running at capacity while the locomotive works in Schenectady and the steel mills in Syracuse are not doing so well, or the reverse.

This information will be of the highest practical value. Basing his observations on it, the sales manager will know definitely whether or not the dealers in any city or county are selling as many cars or trucks as they should. If they aren't he will know something is wrong with the dealers. He will know the sections in which the dealers are having the hardest sledding and will be able to give them greater practical assistance.

Motor vehicle makers have centralized and concentrated authority and responsibility in the manufacture of their products most of them, but they have scattered authority and responsibility in the marketing of those products. Marketing properly should include:

Research.
Sales.
Advertising.
Service.
Dealer relationships.

The marketing director or sales manager or whatever he may be called should have direct control over all this work instead of leaving it in the hands of practically independent departments.

Research must be organized so that an enormous amount of useful data can be brought in constantly. These data should be segregated into two classes:

That which is of immediate value in directing sales.
That which will be of value in determining long swing policies.

Information of this character will be of little value if it is permitted to accumulate in a hopeless jumble. Comparison of statistics accumulated over a period of years

will be tremendously helpful in making plans for the future. It may prove conclusively that substantially larger profits can be made by changing the character of the product.

What happened in May, on the other hand, may give some line on what to expect in June, but it may have no bearing whatever on determining what is likely in July. Long swing plans may be built on what happened yesterday, but current selling campaigns must be based on what is going to happen tomorrow.

Staff Needed to Get Information

It is obvious, therefore, that one or two men, no matter how able they may be, cannot gather all the information needed. Prompt accumulation of the fact material required will necessitate the services of a staff in the field as well as trained men in the office to assemble and analyze it. Dealers can be most helpful in providing week-to-week reports on business in their territories, but entire reliance cannot be placed in them for intimate knowledge of conditions sometimes warps the vision. Their reports should be checked from independent sources.

Many of the present theories in relation to actual sales work can be retained, but they will need revision in their practical execution. Travelers must be something more than order takers. They should be teachers and they should be able to inspire enthusiasm. When a dealer has been properly taught and enthused orders will come automatically according to general business conditions in his territory. The right type of traveler is scarce, but he can be found and he is worth a good salary.

None of the present sales activities should be suspended. To the contrary, they should be widened and improved. They should be correlated, however, and welded together into a definite marketing policy. Business conditions in different sections should have a direct influence on advertising. Copy should be made to fit conditions. Some argument which might have a strong selling appeal in Texas in December might be ludicrous in Minnesota in the same month. The man who has his finger on business conditions everywhere should direct the preparation of copy and should advise dealers frequently what to do with their own copy.

Sales Largely Dependent on Service

Service is even more closely related to sales than advertising. It has more than anything else to do with repeat orders and the volume of business in the long swing. The service manager's position should be one of much more importance than it is today, although there has been of late a happy increase in the degree of recognition given him. He must have enough help to insure the right kind of constructive work. He should not be kept so busy attending to details that he has no time for thought. He must see that all dealers instead of some of them give good service at a fair price. He must see that purchasers of his company's products keep on buying them year after year.

Dealer relationships are of the highest importance in the factory selling scheme. Unless the actual selling organization is prosperous and contented the market for the company's products will be circumscribed no matter how efficient the factory marketing organization may be. Dealers must be made to feel that their contracts have an actual money value. They must know that the factory takes a deep personal interest in their problems and that it always will give practical assistance in solving them. Much remains to be done in the way of dealer education. Training is cheaper than constant turnover.

All in all, the sales manager of the future will have a man's sized job. His department must be enlarged and strengthened and given greater recognition. It will cost money, but it will be money spent with a purpose. If the work is properly organized and directed it will materially reduce selling costs in the long run and it will keep down manufacturing costs by increasing volume.

When there is not enough business to keep all factories running at capacity the ones with the most efficient selling organizations will get the lion's share if they have meritorious products.

The most difficult problem connected with passenger car production will be related to the necessity of turning

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out closed models in ever larger quantities in factories which have been geared up to make a preponderance of open cars with the greatest possible efficiency. Such a radical change in the basic product will involve constant study and development in a field in which the automotive industry has made greater progress than any other. There need be no fear, therefore, of insurmountable difficulties in this direction, for none of the factors involved will be so troublesome as many of those which already have been overcome.

Automotive engineers and production men are equal to any tasks which may be imposed upon them. Improvements in construction and design will come almost automatically. The present day motor vehicle is not perfect, but its faults are not serious enough to diminish its utility as a means of transportation. Rivalry for business will insure constant improvements, especially in fuel economy and low maintenance costs.

Much remains to be done in the study of closed body design and construction for quantity production. Giant strides in this direction have been made in less than two years, but vastly less is known about this subject than about open bodies, and uninterrupted experimentation will be required for a long time to come.

Lower Cost of Closed Bodies

Means must be found to lower still further the cost of closed models. Manufacturing costs will be brought down as the volume of the output increases, and so long as demand on a big scale exists there will be incentive for continued diligence. Every owner of an open car is a potential purchaser of a closed car, and there appears to be no bottom to the market. The fact that prices of open models will rise, of necessity, as the volume of production decreases, will of itself bring more purchasers into the closed field.

New Packard Has Eight-in-Line Engine and Four Wheel Brakes

Is now in production with wheelbase lengths of 136 and 143 in. and nine body styles. Will replace the twin-six. Engine resembles single-six in general design. Is reported to develop 85 hp. at 3000 r.p.m. and to be free from vibration.

By J. Edward Schipper

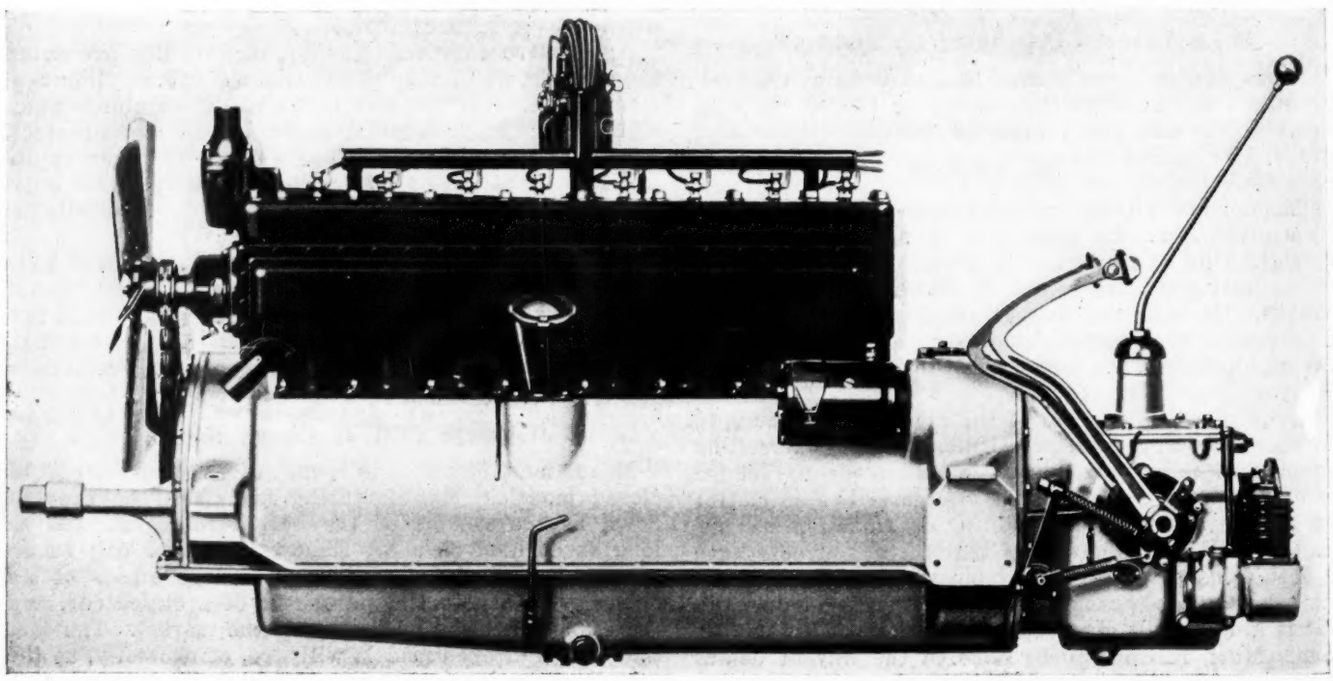
THE new Packard chassis, incorporating two of the most discussed features of automobile design—an eight-in-line engine and four wheel brakes, is now in production. The car will be built in two wheelbase lengths, 136 in. and 143 in., and will be provided with nine body styles ranging in price from $3,650 for the five-passenger phaeton to $4,950 for the seven-passenger limousine. Six of the new bodies are mounted on the shorter chassis and three on the longer. The new model replaces the twin-six and rounds out the Packard line, of which the single-six will continue to be the backbone.

In designing a model to take the place of the twin-six, it has been the aim of the Packard company to provide maximum performance and comfort, with price a secondary consideration. The eight-in-line engine has been selected because of its overlapping power impulses, its inherently good balance, with consequent freedom from vibration periods within the range of driving speed, and its relative accessibility. With the rapid acceleration and unusual speed range provided by this power plant, four wheel brakes have been installed to provide corresponding deceleration characteristics. The advantage of greater lasting qualities of the brakes themselves is also gained.

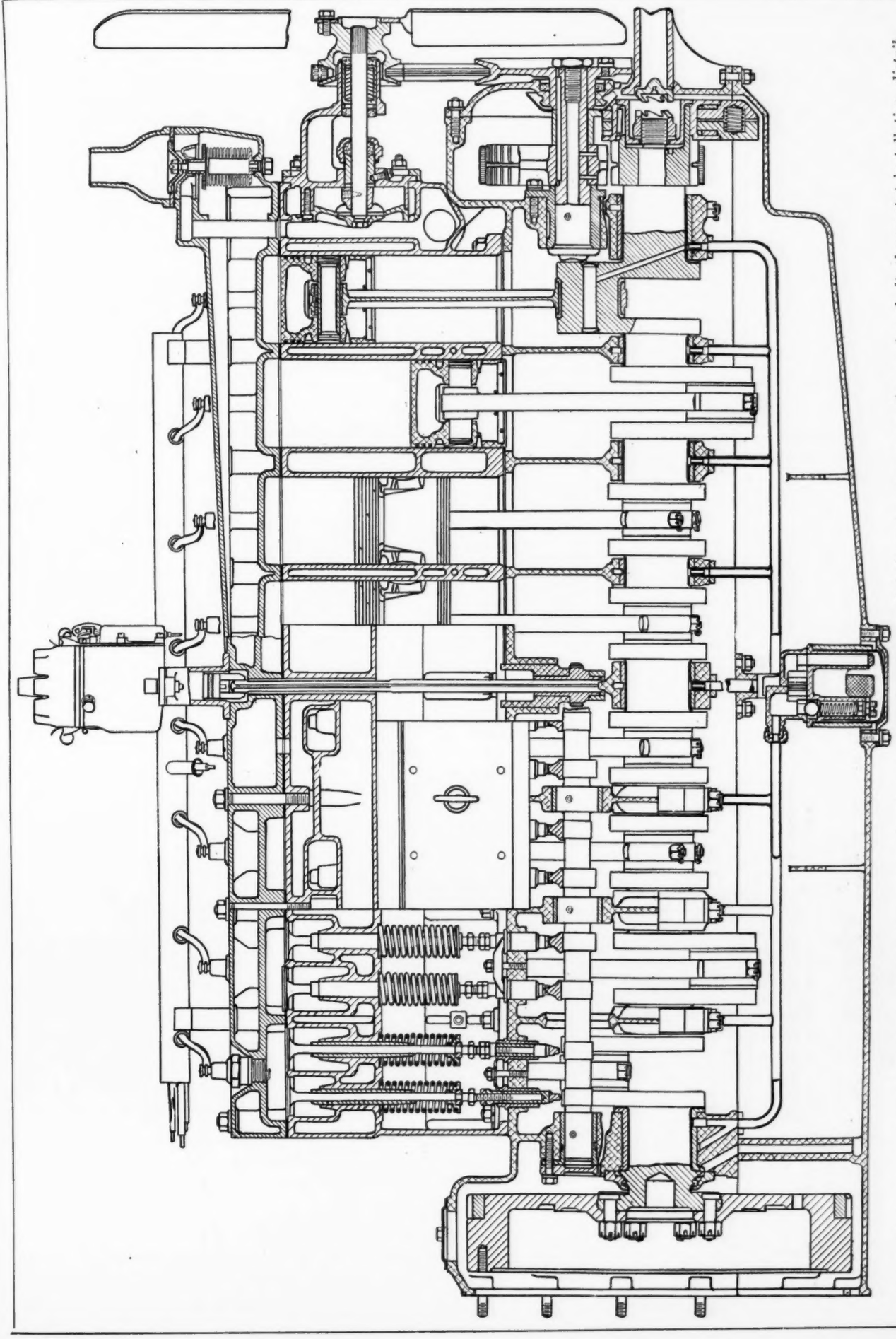
The eight-in-line engine is a 3⅜ by 5-in. block cast, L-head type. The piston displacement per cylinder is 44.74 cu. in., a total of 357.94 cu. in. for eight cylinders. The volume of the clearance space is 12.8 cu. in., giving a compression ratio of 4.51. The engine was designed to develop 85 hp. at 3000 r.p.m., and approximates this output on the block. The engine is combined with the clutch and transmission gearset as a unit power plant with four-point suspension.

Insofar as the individual cylinders, pistons, connecting-rods and valve gear are concerned, the engine follows usual practice. The crankshaft, however, because of the linear arrangement of the eight cylinders, involves some interesting factors which are particularly concerned with the elimination of vibration. The crank pins for cylinders No. 3, 4, 5 and 6 lie in one plane at right angles to the common plane of the crank pins for cylinders 1, 2, 7 and 8.

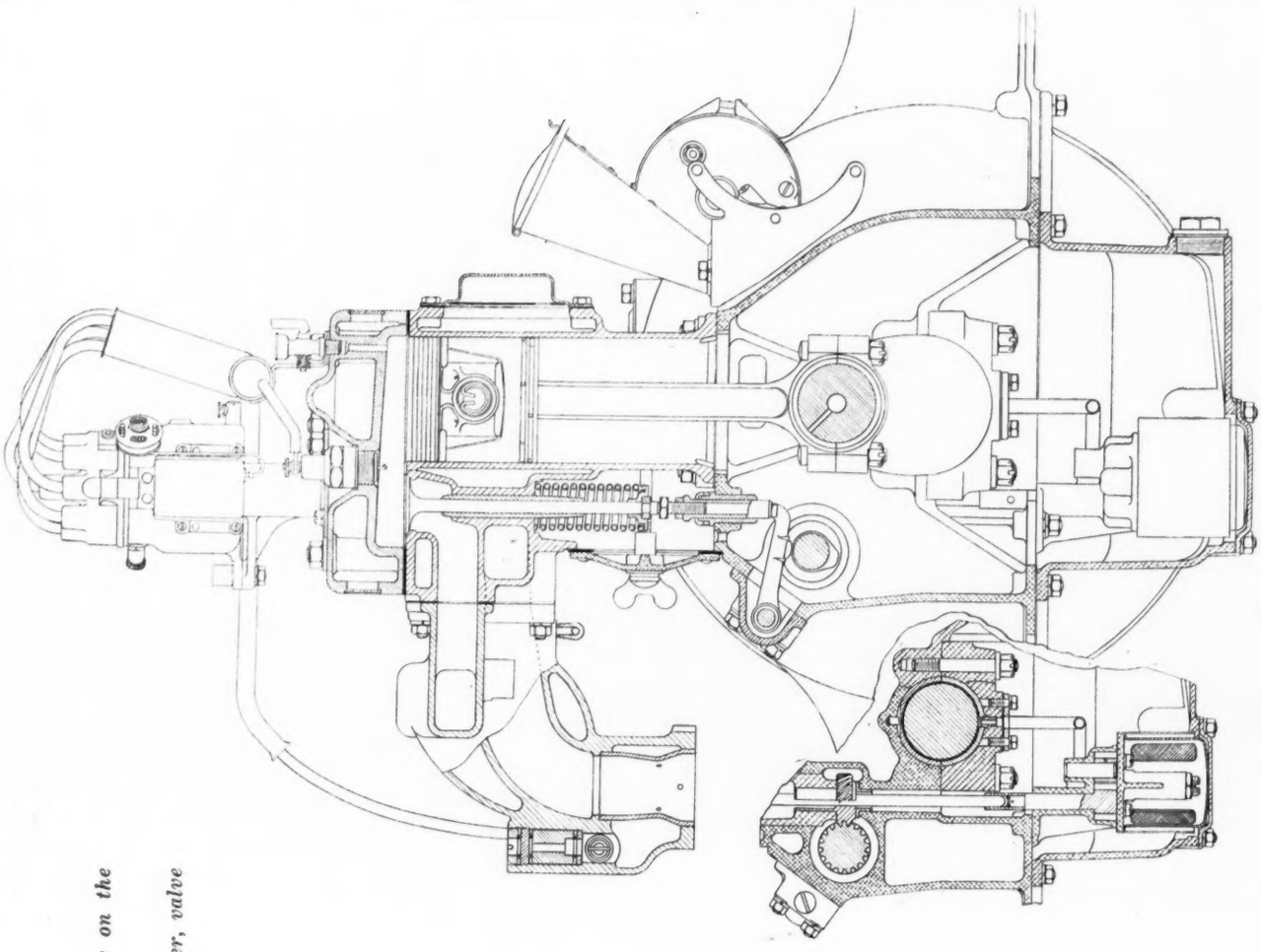
This crankshaft arrangement has been chosen because of its relative freedom from vibration and couples, due either to the inertia forces of the reciprocating parts or unbalanced rotating parts. In addition, a nine-bearing construction is used to provide a small intervening span between the main bearings, giving a rigid support to the crankshaft. To minimize torsional deflections large diameters of main and crank pin journals are employed and a



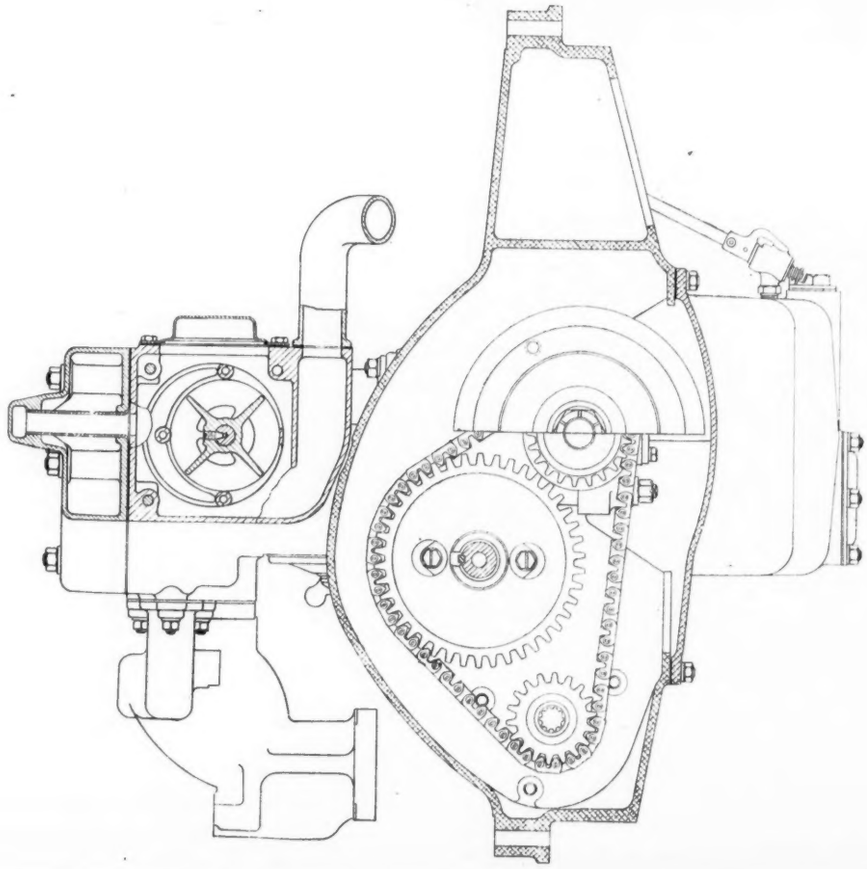
Left side of Packard eight-in-line engine showing unit powerplant construction with four point suspension



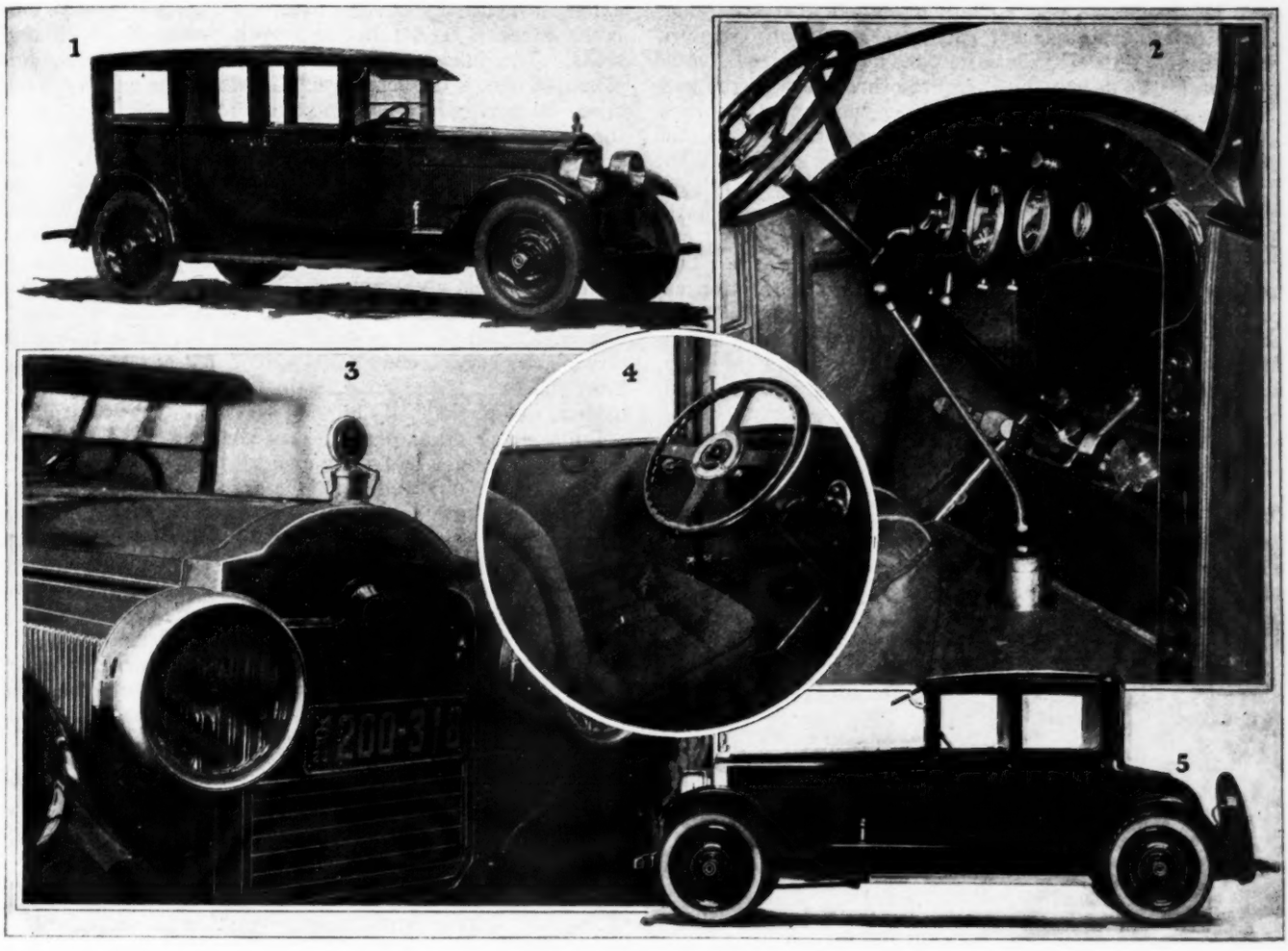
Longitudinal section through Packard eight-in-line engine showing the nine bearing crankshaft, water pump mounting on fan shaft, thermostat installation, distributor and oil pump drive



Below, part sectional view showing pump and triangular silent chain drive on the Packard eight-in-line engine



At right, transverse section of engine showing flat form of combustion chamber, valve rocker, oil pump, intake manifold and other parts



1—*Seven-passenger Packard sedan mounted on* 143-*in. wheelbase chassis.* 2—*Instrument board on the new eight-in-line.* 3—*Front view showing lamps, Moto-Meter and Winterfront used as standard equipment.* 4—*Top view of new steering wheel.* 5—*The four-passenger coupe model*

vibration damper is fitted to the front end of the crankshaft. With the engine supported in the chassis frame at four points by integral crankcase arms, two at the forward end and two at the flywheel housing, it is claimed that the effect of torque reaction is inappreciable.

The cylinder block is a hard gray iron casting. The bores are ground to size and furnished in one standard of limits only. The block is so designed that water completely surrounds each cylinder barrel with large water passages to the separately cast head. The crankcase is an aluminum alloy casting made in two parts. The crankshaft and camshaft bearings are in the upper part of the case, and the lower part forms the oil reservoir. The lower half can be removed without disturbing the crankshaft bearings, the front cover or the clutch and gearset assemblies. There is an inspection opening in the upper half over the flywheel to facilitate checking the timing and also one at the front end of the case for inspecting the chain adjustment.

Light Aluminum Pistons Employed

The pistons are slotted aluminum alloy three ring type. These, in connection with the other reciprocating parts, are designed for lightness, the total reciprocating weight per cylinder being 1.78 lb. The weight of each piston assembly alone is 1.25 lb. and that of the upper end of the connecting-rod assembly is .53 lb. The rotating weight of the connecting-rod assembly is 1.50 lb. The pistons are 3.625 in. in length and carry the three ⅛-in. rings above the piston pin. There is an oil groove at the bottom of the piston skirt. The piston pin is anchored in the piston with the bearing in the upper end of the connecting-rod. The outside diameter of the pin is ⅞ in. and the bearing length 1¼ in. The connecting-rods are of I section and measure 10 in. center to center.

Crankshaft Has Nine Main Bearings

The crankshaft is drop forged from high-carbon steel, heat treated, machined all over and machine balanced. The nine main bearing journals are finish ground and lapped to size. The crankshaft is drilled from each main bearing to the adjacent connecting-rod bearing for the purpose of forming oil ducts which supply oil under pressure to each connecting-rod bearing. The crankshaft thrust is taken on the rear main bearing, and a special oil guard is provided at that point to eliminate the leakage of oil. The crankshaft bearings are of the bronze shell, babbitt-lined type and have the following dimensions:

	Diameter	Length
Crankpin	2⅛ in.	1 1/2 in.
Main bearing No. 1	2⅜ in.	2 15/16 in.
Main bearing No. 2	2⅜ in.	1 3/16 in.
Main bearing No. 3	2⅜ in.	1 11/16 in.
Main bearing No. 4	2⅜ in.	1 3/16 in.
Main bearing No. 5	2⅜ in.	1 15/16 in.
Main bearing No. 6	2⅜ in.	1 3/16 in.
Main bearing No. 7	2⅜ in.	1 11/16 in.
Main bearing No. 8	2⅜ in.	1 3/16 in.
Main bearing No. 9	2⅜ in.	2 1/2 in.

A 1½-in. Morse silent chain arranged in a triangular layout drives the camshaft and generator shaft from the crankshaft. This chain is adjustable by moving the pivoted generator. To adjust the chain, the three nuts on the generator flange stud are loosened. Since the generator pivots about the lower stud, the top of the generator is rotated about it away from the engine until the chain has the proper tension.

The camshaft is a drop forging with 16 integral hardened and ground cams. A spiral gear is forged and machined integrally with the camshaft at the center. This gear drives the gear oil pump below and the ignition assembly above. The shaft is drilled to form an oil lead to the camshaft bearing. The camshaft bearings are aluminum permanent mold castings, except the front bearing, which is subjected to the driving load and is babbitt lined.

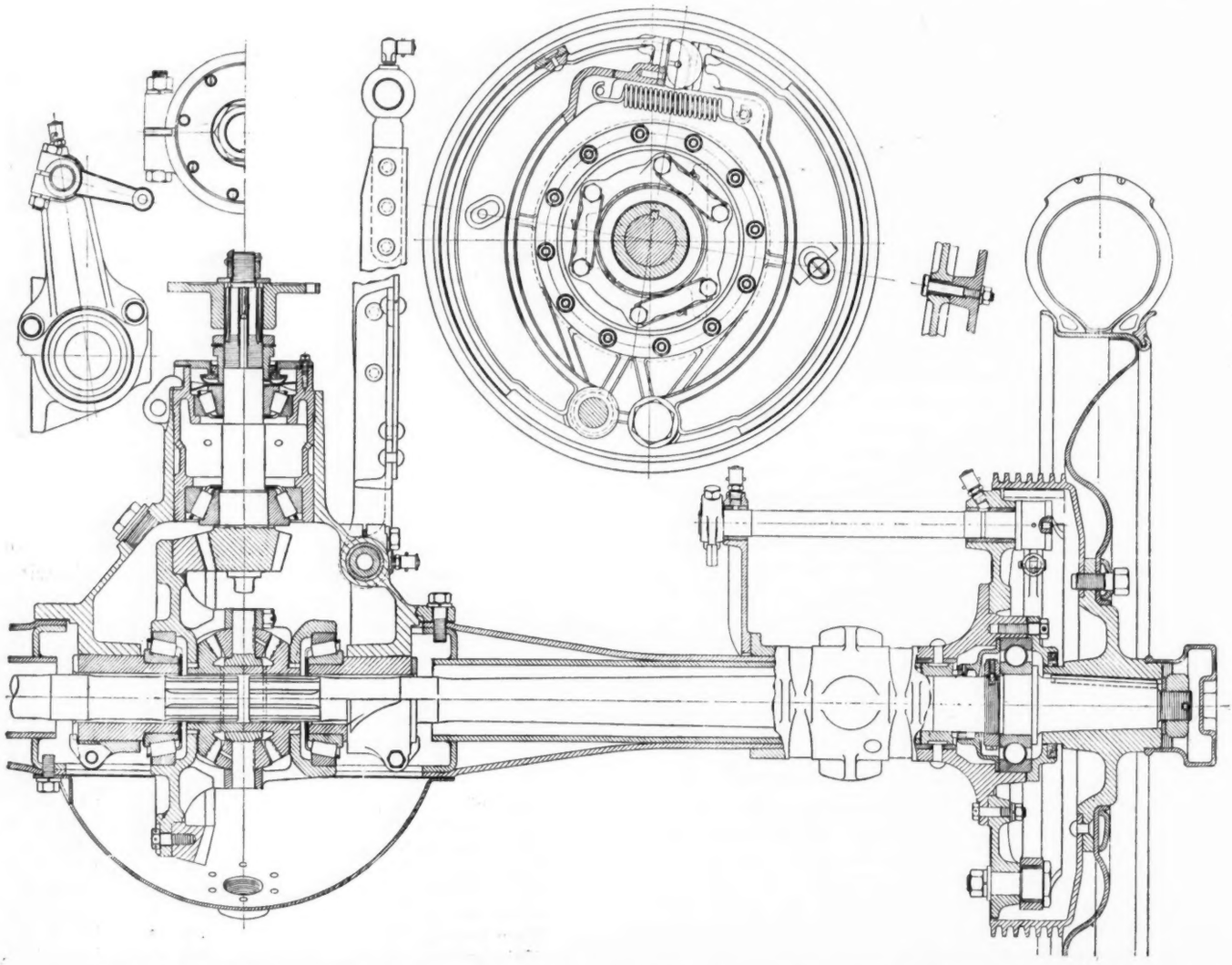
Valves Operated Through Rocker Levers

The camshaft operates the valves through rocker levers pivoted to the crankcase. The rotation of the cams lifts the free ends of the rocker levers which contact with the valve tappets. A boss located approximately at the centers of the rocker levers serves as the cam follower. This construction is used to reduce side thrust to a minimum, to reduce wear on the valve tappet guides and also to insure quiet operation of the valves and tappets.

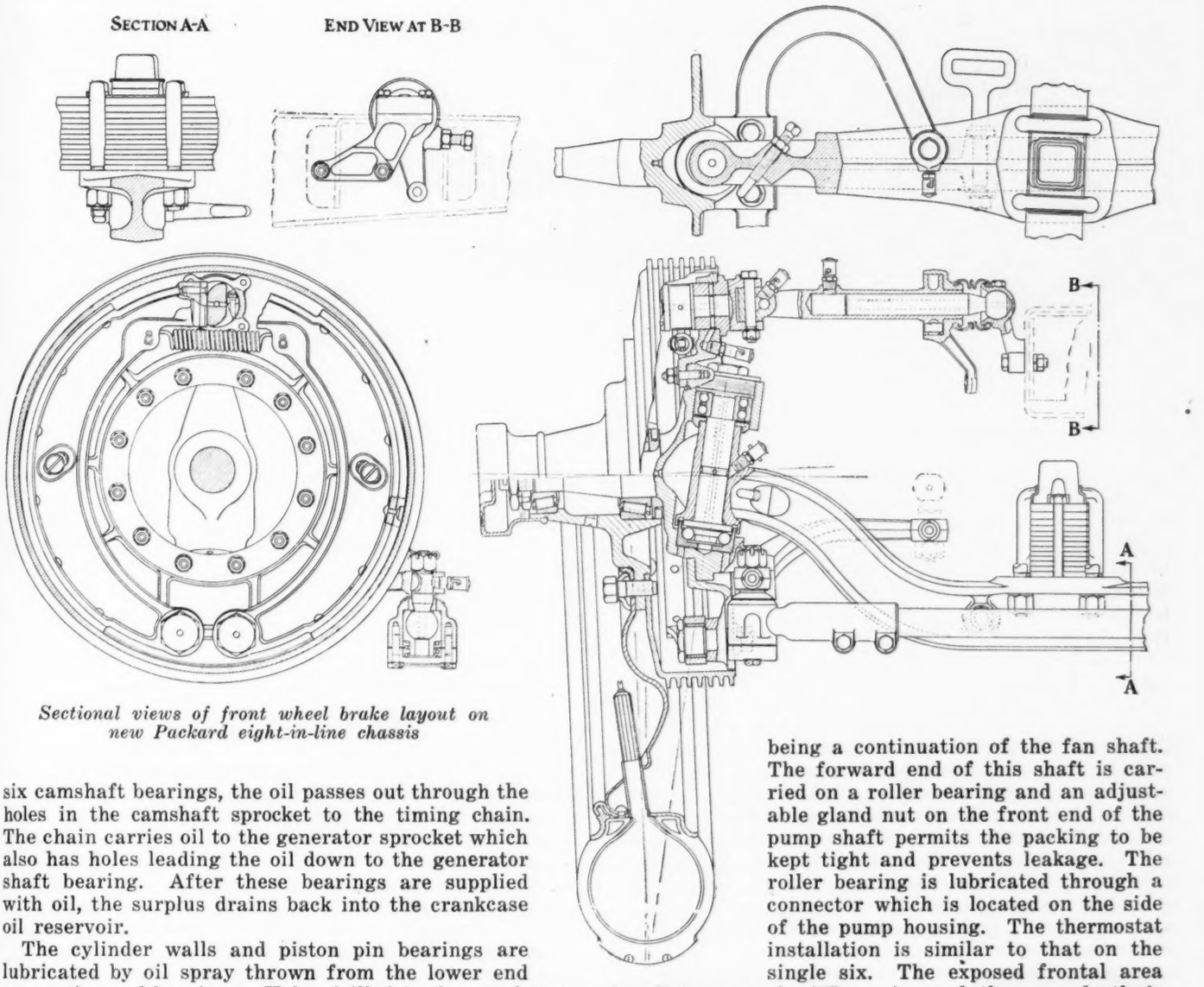
There is one inlet and one exhaust valve per cylinder. The inlet valves have a clear diameter of 1⅝ in. and the exhaust valves a clear diameter of 1½ in. The lift on both valves is 11/32 in., and both valves have 45 deg. seats. The inlet opens at 10 deg. after top center and closes 45 deg. after bottom center, while the exhaust valve opens 50 deg. before bottom center and closes 5 deg. after top center. The firing order is 1-3-2-5-8-6-7-4.

The main fuel tank is at the rear of the frame. Fuel is fed to the carbureter through a vacuum tank on the dash. The capacity of the main tank is 21 gal. A Stemco gasoline gage is mounted on the instrument board. One carbureter supplies the entire eight cylinders. It is mounted on the right side of the engine and is supported by the intake manifold which also contains the "fuelizer." The carbureter is the regular Packard air-valve type with a two-stage spray nozzle and a cylindrical mixing chamber. The "fuelizer" is the same as that used on earlier Packard models, except that it is built directly into the manifold.

Lubricating oil is drawn from the crankcase reservoir through a strainer and is pumped to the main oil-distributing manifold supported from the crankshaft bearing caps. From this manifold the oil is supplied to the nine main crankshaft bearings through holes drilled in the bearing caps. Independent oil passages in the cranks carry the oil to the connecting rod lower end bearings. The camshaft bearings are lubricated by oil which is forced to the hollow camshaft from the oil lead running from the crankshaft rear bearing to the camshaft rear bearing. After passing through the hollow camshaft and lubricating the



Packard semi-floating rear axle with pressed steel housing. Torque arm takes part of the rear axle torque, the remainder being taken through the rear springs which also take the driving thrust



Sectional views of front wheel brake layout on new Packard eight-in-line chassis

six camshaft bearings, the oil passes out through the holes in the camshaft sprocket to the timing chain. The chain carries oil to the generator sprocket which also has holes leading the oil down to the generator shaft bearing. After these bearings are supplied with oil, the surplus drains back into the crankcase oil reservoir.

The cylinder walls and piston pin bearings are lubricated by oil spray thrown from the lower end connecting-rod bearings. Holes drilled in the crankcase allow oil mist to rise into the valve compartment and lubricate the valve mechanism. Baffle partitions located crosswise in the bottom of the crankcase retard the surging of the oil. The oil is circulated under a pressure of from 20 to 35 lb. while running at 25 miles per hour and not less than 2 lb. pressure at 5 miles per hour, with the standard rear axle ratio and the engine warm. These pressures are indicated on an oil gage mounted on the dash.

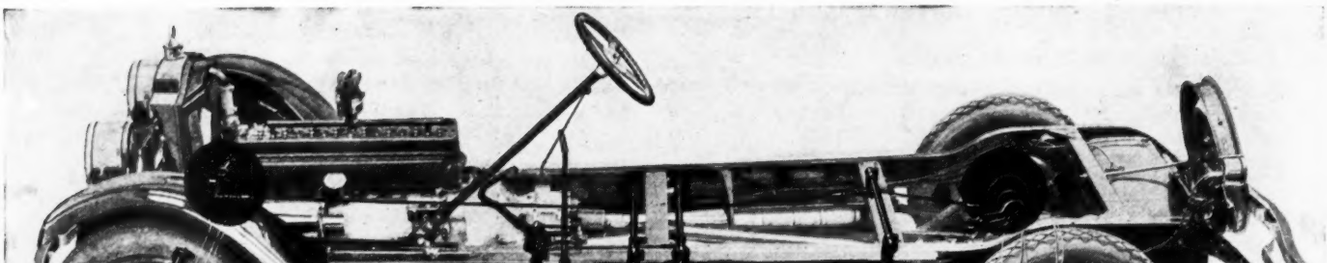
The oil pump is a gear type located at the lowest point of the crankcase and is operated by a shaft driven from the spiral gear on the camshaft previously mentioned. The pump can be removed for cleaning or inspection by taking off the lower half of the crankcase and unscrewing the nuts which hold it to the bottom of the upper half and disconnecting the oil manifold. The oil pressure is regulated by means of the oil pump release valve, which is accessible through a cover plate in the bottom of the crankcase lower half. The oil relief valve is contained in the pump body. It is controlled by the tension of a coil spring. The inlet to the relief valve is connected with the pump discharge passage, and any excess pressure causes the valves to open and allows the oil to return to the pump inlet.

Cooling water is circulated by a centrifugal pump mounted at the forward end of the cylinder block. The pump housing is cast integrally with the cylinder block. The impeller is driven by the fan belt, the pump shaft being a continuation of the fan shaft. The forward end of this shaft is carried on a roller bearing and an adjustable gland nut on the front end of the pump shaft permits the packing to be kept tight and prevents leakage. The roller bearing is lubricated through a connector which is located on the side of the pump housing. The thermostat installation is similar to that on the single six. The exposed frontal area of radiator core is 457 sq. in. and the core depth is 3⅜ in., giving a block volume of core of 1540 cu. in., or 4.3 cu. in. of core per cu. in. of piston displacement. The fan is a 21-in. six-blade aluminum type running at 1.3 times engine speed. The water capacity of the cooling system is 5½ gal. A Motometer and Winterfront with automatic thermostat operated shutters are provided as standard equipment.

The electrical system is the Packard Delco single wire or ground return type. The generator is supported on the crankcase at the right front corner of the engine and driven directly from the silent chain. The cutout relay is mounted on top of the generator. The starter motor is located on the left side of the engine close to the cylinder block and is attached to the front face of the flywheel housing by means of a long pilot and one dowel screw, permitting ready removal for inspection.

Battery Located in Front Fender Compartment

The battery is a 100-amp.-hr. type mounted in a compartment located in the front fender. It is accessible by removing four screws which hold the aluminum cover plate. The wiring is inclosed in junction boxes and conduits and is entirely out of sight. Binding posts have been provided at the front of the dash to facilitate the removal of all wires and conduits when the body is removed. At the back of the dash, binding posts are provided for the connection to the coil and switch. The electric lighting system is

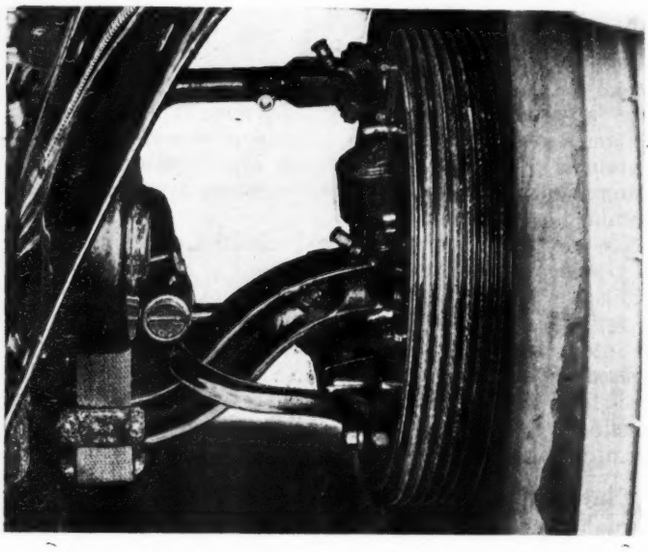


Arrangement of four-wheel brake operating mechanism showing equalizer shafts and other parts

protected by a circuit breaker located at the back of the lighting switch on the instrument board. The connection for the stop light is incorporated in the brake mechanism.

The lighting system includes two main headlamps, combination tail and warning signal, instrument board lamp, tonneau light in open bodies and dome light in the closed bodies. The headlamps provide three degrees of illumination. Lights of 25 to 30 cp. situated in the principal focus of the reflector furnish a high degree of illumination when needed. For city driving, auxiliary lights of 20 to 25 cp. out of the principal focus furnish a more diffused light, and for parking a light of 2 cp. is furnished by a low filament in the auxiliary bulb. The Packard Delco ignition unit is mounted directly on the engine cylinder head between No. 4 and No. 5 cylinders and is driven from the camshaft. The coil is located on the rear of the dash.

The clutch is a non-adjustable multiple disk type with five driving plates. It is mounted in a separate compartment at the front end of the integral clutch and transmission case. The clutch disks are 8 in. outside diameter and 6 in. internal diameter, giving a projected area per disk of



View of brake installation on front wheel showing ribbed drum and steering connections

22 sq. in. There are eight frictional surfaces, giving a total of 176 sq. in. The total spring pressure employed is 520 lb., giving a pressure per sq. in. of projected area of 23.6 lb. Wear on the surfaces is automatically taken up by the springs.

The gearset is a selective sliding gear type providing three speeds forward and one reverse. The length of the gear teeth is so chosen that there is considerable overlap between a pair of teeth coming into engagement and a pair going out of engagement. This element is claimed to improve the durability of the teeth by making smoother transference of load from one pair of teeth to another. It is also claimed that this reduces the noise because the rapidity of this transfer is considerably reduced.

The tooth surfaces are all given a ground finish and are held to extremely close limits of accuracy. The reductions are 3.35 to 1 on first speed, 1.75 to 1 on second, direct on third and 4.18 to 1 on reverse. The gearset driving shaft is mounted on a roller bearing at the front end and on a two-row ball bearing at the rear end. The countershaft is mounted on two roller bearings. The speedometer shaft is driven by a pair of spiral gears installed at the rear end of the gearset shaft.

The drive is carried to the rear axle through a tubular propeller shaft fitted with two metal type universal joints. Over the front joint mounted on the rear end of the gearset is a metal shield to prevent grease from reaching the bottom of the floor board, even in case of accidental leakage of grease from the universal joint housing.

The rear axle is a semi-floating type with a pressed steel housing. Part of the torque of the rear axle is taken by a pressed steel torque arm and part by the rear springs. Driving thrust is taken through the springs. The pinion shaft is mounted on adjustable taper roller bearings and the rear axle shafts are mounted on single row ball bearings. The roller bearings used in connection with the rear axle are the new steep angle type designed to have a greater thrust capacity than the conventional type. The axial component of movement, due to any wear of the bearing, is claimed to be very small, so that the end play of the pinion shaft is minimized, resulting in a longer maintenance of gear adjustment.

Differential Bearing Mounting Improved

In this axle an improvement has been made in the differential bearing mounting. In order to eliminate the distortion of the bearing shell which often occurs when the differential bearing outer race is clamped into place, the outer race of the differential bearings are pressed into the differential housing, while the bearing cones are mounted on adjustable sleeves which fit reamed cylindrical seats in the differential carrier. This mounting is intended to eliminate any clamping, although the races are well supported to hold the true shape. The standard rear axle ratio is 4½ to 1.

The disk wheels are designed for 33 by 4½-in. tires.

The spare wheel is mounted on a carrier bolted rigidly to the frame rear cross member and cross tube. This carrier is a hub clamping type without straps or shoes. The spare wheel is clamped between the carrier and a screw cover operated by a convenient T-type handle in which is fitted a barrel-type lock.

The brakes, which operate on the four wheels simultaneously, are mechanically operated internal expanding shoe type. The brake shoes are cast aluminum faced with wire woven asbestos. When pressure is exerted on the pedal the motion is transmitted to a crank through a planetary gearset which steps up the motion so that the crank moves through 90 deg. for a 26-deg. movement of the pedal. The crank is so positioned that the motion of the cable attached to it is rapid at the start and progressively slower as the pedal is depressed so that the leverage increases correspondingly. The brake cable passes from the crank over a sheave which is supported on the end of a lever fastened to the rear brake equalizing shaft and the outer end of the cable is attached to a second lever which is supported by and anchored to the front brake equalizer shaft. As the pedal is moved, this cable rotates both equalizer shafts, and serves as an equalizing mean between front and rear brakes.

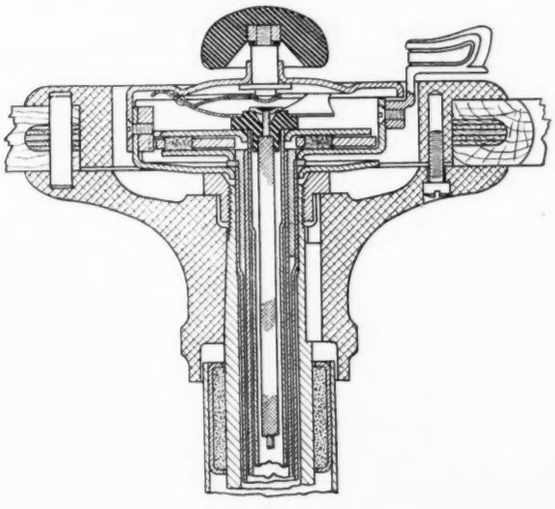
The cable which operates the front wheel brakes is pulled by levers on the forward equalizer shaft, while the rear wheel brakes are actuated by the pull from levers on the rear equalizer shaft. The cable for the front wheel brakes is thus separate from the cable which operates the rear wheel brakes.

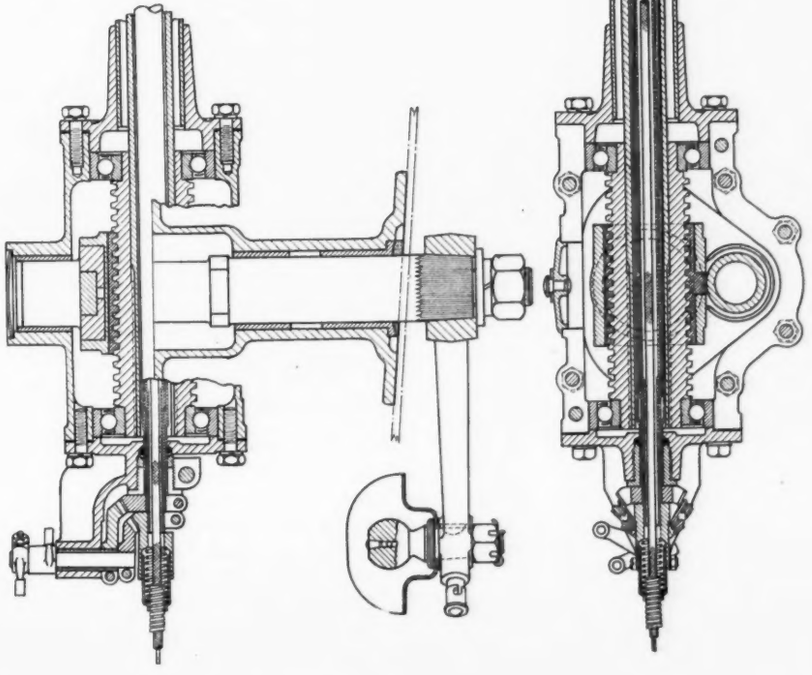
One end of the front brake cable is attached to the left front wheel brake camshaft lever and the other end to the right front wheel brake camshaft lever. The pull on the brake mechanism is equalized between the two front wheel brakes by this cable which passes over sheaves and through the equalizer shaft or cross tube. For operating the rear brakes, a similar cable equalizing device is used, except that the cable ends are attached to loose intermediate levers on the rearmost brake cross tube, which levers are connected to the rear brake camshaft levers by solid rods.

As the pedal is depressed, both the front and rear equalizer shafts are rotated, pulling on the respective cables which pass through the equalizing sheaves, consequently not only equalizing the pull to the front and rear wheel brakes, but also to the individual left and right brakes at the front and rear. At its inner end the front brake camshafts are telescoped over ball ended stub shafts which are free to slide within the hollow camshaft and to turn in sockets attached to the frame side members. The sliding joint and the universals at the outer end of the shafts take care of the movement of the wheel in steering and any other relative movements between the wheel and chassis.

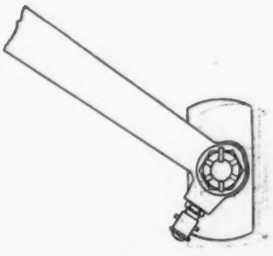
Brake Drums Have Cooling Ribs

The hand brake lever operates the same rear brakes as are used in the pedal system, through the same rods from the rear cross shaft. When the hand lever is pulled it rotates the cross shaft and with it rigidly attached arms which pick up the loose levers attached to the rear brake pull rods. When the foot brake is applied these arms remain stationary and the loose levers are pulled away by the foot brake cable mechanism. When the hand brake is applied, the levers attached to the rear brake shaft pick up the loose levers and apply the rear wheel brakes independently of the front wheels.





New steering gear on the Packard eight-in-line chassis. The nut has a babbitt lining which is cast around the screw in order to insure full bearing on the thread surface



All four brake drums are drop forged from high-carbon steel with ground finish on the engaging surfaces and external cooling ribs.

The front axle is designed to take the front wheel brake torque. The steering knuckle pins in this axle are inclined so that the center lines produced meet the ground at the central point of tire contact. The knuckle pin is mounted top and bottom on ball bearings, the upper bearings having two rows of balls and taking radial loads only. The lower bearing, in addition to the radial load, takes the downward thrust of the weight of the front wheels. The front wheels are mounted on tapered roller bearings, and are arranged to toe in ½ in.

The steering gear is a worm and nut type. In order to overcome the difficulty in manufacturing a worm and nut so that all of the thread surface of the nut fits closely the mating surface of the male member, each nut is made individually for each individual screw. The nut consists of a bronze shell with a babbitt lining. This shell is mounted in a special fixture in proper position relative to the screw. Babbitt metal is then poured into the space between the shell and the screw, the screw acting as a mold for the threads which are formed in the babbitt anchored in the bronze shell. In this way the threads of the nut are made to fit with the threads of the screw, all of the bearing space being effective without end play.

All springs are semi-elliptics, the front springs being 38 in. long and 2 in. wide, shackled at the rear end by a compression shackle with the bolts extending through the frame. The rear springs which take the drive are 54 in. long and 2¼ in. wide and are shackled at the rear end. Both front and rear springs are parallel to the tapered frame. Watson Stabilators are fitted front and rear.

Tapered Channel Section Frame

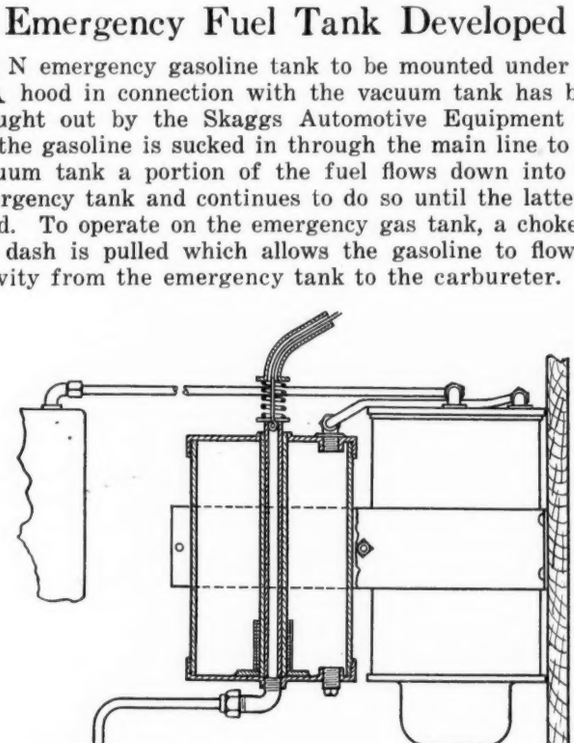
The frame is a channel section with side members 8 in. deep and 5/32 in. thick. The frame is tapered from the front and rear end so that offsets are eliminated. Rigid fittings to which cross tubes are riveted in place are provided at each end. The parts act as stiffeners and at the same time provide special mountings for bumpers which are supplied as standard equipment. Chassis lubrication is taken care of by a pressure grease system, all grease cups having been eliminated. In mounting the muffler to the frame, particular attention has been given to rigidity so as to assist in silencing the exhaust. Heavy brackets are employed and the muffler in turn acts as a support for the exhaust pipe end entering the muffler. The front muffler joint is of the gland type packed with asbestos rope; the rear muffler connection is a flange joint, the flange being pinned and brazed to the tail pipe. The muffler itself is of rigid construction. The outside and inside shells are beaded at intervals for stiffness and the entire assembly is held together by five bolts passing from end to end, clamping all parts rigidly together and assisting in forming non-leaking joints. Fitted to the rear of the tail pipe and acting as its support is a specially designed casting secured to the frame. This fitting has a mouth so formed as to give gradual expansion to the exhaust gases. Resonance in the shell of the muffler is damped out by lagging it with asbestos.

There are nine body types available on the new chassis. On the 136-in. wheelbase chassis there are a five-passenger phaeton priced at $3,650; two-passenger roadster, $3,850; five-passenger sedan, $4,650; five-passenger coupe, $4,725; four-passenger coupe, $4,550, and five-passenger sedan limousine, $4,700. On the 143-in. chassis are the seven-passenger phaeton, $3,850; seven-passenger sedan, $4,900, and seven-passenger sedan limousine, $4,950. The 136-in. wheelbase chassis weighs 3170 lb. and the 143-in., 3220 lb. The five-passenger phaeton on the 136-in. wheelbase chassis weights 3870 lb. The seven-passenger phaeton on the 143-in. chassis weighs 4020 lb. Open car bodies and door panels are finished in dust-proof gray striped with vermilion. Bonnet molding and top body molding are black. The wheels are dust-proof gray striped with vermilion and black. The bonnets are dust-proof gray with the louvre striped with vermilion. All of the other parts are black, except for the metal parts which are nickel plated.

The closed cars are Packard blue striped with twentieth century red, medium, with black moldings. The upper body and the body front is of black and the wheels are blue striped with medium red. The bonnets are blue with red striping on the louvres. All other parts are black with the exception of the metal parts, which are nickel plated. The open cars are trimmed in Spanish leather and the closed cars in button tufted upholstery cloth.

Emergency Fuel Tank Developed

AN emergency gasoline tank to be mounted under the hood in connection with the vacuum tank has been brought out by the Skaggs Automotive Equipment Co. As the gasoline is sucked in through the main line to the vacuum tank a portion of the fuel flows down into the emergency tank and continues to do so until the latter is filled. To operate on the emergency gas tank, a choke on the dash is pulled which allows the gasoline to flow by gravity from the emergency tank to the carbureter. To refill the emergency tank it is only necessary to put the choke in the original position and the flow into the emergency tank will be continuous until the tank is full.



Skaggs emergency gasoline tank which operates in conjunction with a vacuum tank

The Skaggs tank is equipped with a sediment trap in the bottom and a drain plug for cleaning out the sediment and water, which falls down into the emergency tank instead of passing over into the vacuum tank. There is also a screen to keep any dirt from passing out to the carbureter.

A NEW grade of Micarta, known as No. 238 Micarta, has been developed by the Westinghouse Electric & Mfg. Co. for use in the manufacture of gears and pinions of small pitch and face width, such as are used in magnetos. The new product is made from a good grade of fine fabric and it is claimed that because of this feature and its densely homogeneous structure it can be machined very accurately and is very adaptable for fine pitch applications.

Big Producers Accounted for May Output Gain

Three makers alone turned out approximately 20,000 more than in preceding month. Additional working day also helped maintain mark. Total for last 12 months slightly exceeds 3,500,000

ANOTHER production record for the industry was hung up in May. An output of 405,000, on top of 382,000 in April, was as surprising as it was gratifying, especially in view of reports from various sections of minor declines in retail sales. It must not be assumed from the figures, however, that all companies increased their schedules last month, for such was not the case. The big production companies in the lowest passenger car price class gained somewhat, and so did a few others, but not many. A majority of the automobile makers lost a little, although in few cases was the decline sharp.

One factor which must be considered is that there were 25 working days in April and 26 in May. Daily production in April was at the rate of about 15,000. Maintenance of the April average throughout May, therefore, would have given an output of 397,000. On the same basis, if the Memorial Day holiday had been eliminated, production should have been 412,000.

While May marked a gain in the number of units turned out, the dollar value of passenger cars probably was somewhat less than the preceding month. Ford production for May was about 171,000, as compared with 160,000 in April. Chevrolet made between 5000 and 7000 more in May than in April, and the gain for the Star was about 3000. This accounts for a total of approximately 20,000 in the lowest price class. If the industry as a whole gained 23,000 and these three companies gained 20,000, the net gain for the other producers was somewhere in the neighborhood of 3000. Eliminating the extra working day there would have been a theoretical loss of 12,000.

Large Producers' Output Estimated

Estimating roughly, the production of these three companies for the two months was:

	April	May
Ford	160,000	171,000
Chevrolet	38,000	44,000
Star	17,000	20,000
Total	215,000	235,000

Deducting the April aggregate of 215,000 from the total of 282,000, all other companies combined had 167,000. By the same process, all other companies had 170,000 for May, with one more working day.

It can be assumed safely that whatever falling off there was in May, outside the ranks of the biggest producers, was divided among passenger car makers and was not shared by truck manufacturers, because it is practically certain that when truck production figures for May are available they will show rather a substantial increase over April. Output of trucks in April was about 37,000, compared with 34,000 in March, and the aggregate for May probably was at least 40,000. Some of the truck gain is included in the Ford total, however.

Obviously this analysis is merely approximate, because definite figures are not yet available, but it serves to show the production trend and that not all companies are faring alike.

Part of the amazing business going to the largest producers can be accounted for by the strong trend of demand towards closed models. There are many persons who would rather have a sedan costing $800 or $900 than on open car in a higher price class costing practically the same.

Undoubtedly all the closed cars made in May were sold, but the same is not true of open models. It is probable that several thousand of the open type made in that month were stored, either by the factories or dealers. The weather was largely responsible for this condition in a good many districts. Closed car sales, on the other hand, were limited only by production capacity.

Forecasts for Future Unsafe

There is much speculation concerning business for the remainder of the year, but forecasts are unsafe. It doubtless can be accepted as a fact that the peak has been passed, but so many diverse factors are involved that speculation about the shrinkage in volume for the next seven months is purely guesswork.

Thus far this year the industry has made 1,504,000 passenger cars and 154,000 trucks, a total of 1,657,000. This is only 11,000 less than for the entire year of 1921. It exceeds every other year except 1917, 1919, 1920 and 1922. The truck total is almost exactly the same as for the whole year of 1921.

The record for the last 12 calendar months has been: Passenger cars, 3,217,000; trucks, 309,000, or the astounding total of 3,526,000.

To reach a total of 3,000,000 passenger cars for the year 1923 it will be necessary to make about 1,500,000 in the next seven months, or an average of 215,000 a month. It is highly improbable that this mark will be reached. It would mean just a little less than the total for the last seven months of last year. It does not seem possible that this pace can be maintained. The score at the end of the year is not likely to exceed 2,500,000 and it may be less. It will depend very largely upon general business conditions.

Sales for the remainder of the year will depend very largely upon the farmer. The extent to which he buys, not only motor vehicles but other commodities as well, will determine the degree to which present prosperity will be continued. He is not yet satisfied with the prices of farm products. He has made much progress in paying off accumulated obligations but his monetary reserves are not yet large.

There probably has been no year in a decade when there has been greater uncertainty in the middle of June about crop prospects. The season has been exceedingly backward and in most sections there has been altogether too much rain. Higher prices, especially for cotton, may offset crop shortages but the outlook for sales will be gloomy in any sections where crops are failures. If the farmer is unable or unwilling to buy, industry must slow up for in the aggregate he possesses half the buying power of the country.

J. D.

Just Among Ourselves

Officious "Head Waiter" Enlivens Wagner Dinner

AN officious Prussian head waiter caused much indignation at the farewell dinner given by the New York Automobile Club at the Astor in honor of Fred J. Wagner, race starter, as he was about to forsake the East for the West. In guttural accents, the waiter bawled out the guests who visited different tables while the meal was being served. He asserted it was in violation of the hotel rules. When apologies were demanded, the Prussian sobbed bitterly, protesting that it was his first day on the job and that he had to make good. Then everyone felt sorry for him. One man got him a chair, another a glass of water and a third a cigar. He broke loose again in a few minutes, however. Greeted with catcalls, hoots and a shower of buns, he called out the waiters and suspended service. Just when it looked as though the dinner would be broken up, the Prussian reappeared at the head of a small army of waiters, all laughing heartily. The Prussian was an actor, hired specially for the job. Edward Jordan had dug him up in Cleveland. Diners who had been indignant, felt and looked sheepish, but joined in the laugh.

Two Classes of Advertisers— Those Who Pay and Ford

GEORGE M. GRAHAM, who has made a reputation not only as an orator but as a humorist—and the two are by no means synonymous—was one of the speakers at the Atlantic City convention of the Advertising Clubs of the World. He said he was glad to be there because there are a lot of advertisers in the automotive industry. "They are divided into two classes," he declared. "Those who pay for their space and Henry Ford. We are proud of Mr. Ford because he is a great manufacturer, but he has demonstrated the truth of the Biblical maxim, 'to him who hath shall be given.'" Consciously or unconsciously, Ford is one of the greatest press agents in the world. But from the newspaper point of view he's news and other notions to the contrary notwithstanding, newspapers don't mind a little incidental advertising when there's real reader interest in the man or thing thus advertised.

Automobile Man Made Director of a Railroad

ELECTION of A. H. Swayne, vice-president of General Motors Corp. as a director of the Lehigh Valley Railroad Co. is a tribute by a veteran in the transportation field to an outstanding representative of a husky youngster in the transportation ranks. It is the more interesting because Swayne is chairman of the committee which is working out a plan for coordination of highway transport and the motor vehicle with rail and water carriers. This committee already has made a profound impression because of the vigor and fairmindedness with which it has attacked an exceedingly difficult task. If more automobile men were railroad directors or if more railroad men were directors of automobile companies it would not take long to wipe out old animosities and misunderstandings. There is no real conflict of interests.

Willys Ready to Join The "Million Car Club"

THE Willys-Overland Co. will turn out its one millionth car about June 18 and will hold a national jubilee to celebrate the event. This will make the fourth American company with a total production running into seven figures. The others are Ford, Buick and Chevrolet. The industry will extend its sincere congratulations to John Willys. He gained control of the Overland company fifteen years ago when he produced $350 in cash to meet the pay roll. He put it on its feet with a loan of $7,500. His feat in putting Overland back on the map after the slump of 1920, when it was carrying an enormous financial burden, by dint of his own personality and sales ability, was even more dramatic. Even more remarkable, however, is the fact that there are now four American companies which have turned out more than 1,000,000 automobiles. It will not be long before more members are elected to the club.

Real Saturation Point Confronts the Industry

ALVAN MACAULEY "said a mouthful" in AUTOMOTIVE INDUSTRIES last week when he declared that "physical saturation is already here" for the automobile. It doesn't matter, as he pointed out, if there still are plenty of people able to buy automobiles if they have no place to run them. He contends, justly, that it is up to the automotive industry to face this new saturation problem frankly and intelligently and to do all in its power to help plan cities so that it can serve them effectively. The market for motor vehicles is circumscribed only by the ability of the country's roads and streets to carry them. There is no general problem, therefore, in which manufacturers and dealers have so vital a personal interest. Most of them have taken altogether too little interest in the closely related subjects of highway building, traffic congestion and safety promotion. The time for concerted, cooperative action has arrived.

Some Truck Companies Again Talk Expansion

EXECUTIVES of most of the larger truck companies are keen students of business condi-

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

tions. They will be perfectly satisfied for some time to come if the demand for their products equals the present productive capacity of their plants, although business with them just now is very good. All of them are having much difficulty in obtaining an adequate supply of materials and parts, but they realize that this is a condition which will be more or less temporary. They are not talking about expansion of their facilities. Some of the smaller companies, on the other hand, which had practically no business for eighteen months after the slump in 1920, seem to think that the relative shortage of parts and supplies is going to last forever, and that their only salvation will be to provide additional factory space. Just at present they could sell more trucks than they can make, and they appear to believe this condition always will exist. They thought the same thing for a couple of years prior to 1920. A good many of the factory additions hadn't been completed when the bottom dropped out of sales.

Experience Shows Caution Really Prevents Accidents

BARRON G. COLLIER, an advertising man who is a special deputy police commissioner in charge of the Bureau of Public Safety, began early in May a campaign to make the streets safer. He did not base his efforts upon the theory that motorists are responsible for all accidents, but rather upon the idea that many pedestrians, especially children, are not only careless but reckless. The result was that the number of persons killed in the streets in May was 62, as compared with 90 in April. Only 31 children under 16 were killed, as against 47 the previous month. A good beginning thus has been made in safety education. One of the expedients adopted has been a "safety hour," between 3 and 4 p. m., when children are leaving school. Factories have cooperated by blowing their whistles at this hour, and motorists by tooting their horns. A little more than half the persons killed in May lost their lives while crossing streets.

Using Advertising Space to Preach "Safety First"

THE Standard Oil Co. of New York is doing accident prevention a service by having "the Veteran Motorist" give a few rules of the road in its advertisements for Socony gasoline and motor oil. "Safety first" is article No. 1 in this creed, and "consideration for the other fellow" is No. 2. "This habit—and it's mostly a habit—of always trying to get ahead of the fellow in front of you, is the cause of more close shaves and real accidents than any other one thing I know of," says the Veteran. "Make sure there's plenty of room ahead of the car you're going to pass. And remember—it's bad business to pass a car near the top of a hill or on a curve. In fact, it's against the law in some States to pass a car on a curve." If more motorists would obey these simple rules of "safety first" and display a reasonable degree of courtesy toward others there would be far fewer accidents on the road.

Statistics on Accidents Disclose Surprising Facts

A COMPILATION of accident claims paid by the Travelers Insurance Co. in the year 1921 provides some interesting statistics. Claims collected numbered 22,784, and 4421 were the result of automobile accidents. Skidding, ditching and overturning were responsible for only 437 of the accidents, but they cost the company three-eighths of what it paid on motor vehicle claims. There were 54 death claims and two for dismemberment. Accidents to pedestrians numbered 2310, but only 312 of them were caused by automobiles, while 463 persons slipped on ice or wet pavement and 773 were hurt by falls caused by uneven ground, curbing or steps. There were 8000 occupational accidents, 3495 at home and 3170 resulting from sports or recreation. For example, nearly 700 persons cut themselves on bottles and sharp instruments or slipped on their lawns, steps and porches. It is interesting to note that sports and recreation cost the company nearly $200,000 more than automobile mishaps.

Oats and Hansom Cabs Passing at Same Time

PRODUCTION of oats in the United States has passed the peak and is on the way down hill, in the opinion of experts in the Department of Agriculture. Advent of motorized trucking, both in the city and country, and of the tractor on the farm has greatly reduced the commercial market for oats, says the 1922 year book of the department. It is predicted that the result will be to reduce materially the acreage and production. This is another historic fact of interest to the industry. Only the other day it was announced that the market for rubber tires for horse-drawn vehicles is disappearing. It seems only yesterday that it was possible to find plenty of hansom cabs "on the avenue" in New York or standing in front of the hotels near that famous thoroughfare. Now they have only one regular stand and that is near the Fifth Avenue entrance to Central Park at Fifty-ninth Street. The drivers, horses and cabs all seem reminders of a past generation, and all three seem to be falling to pieces at the same time. It is another rather pathetic evidence of the steady march of progress. J. D.

Self-Ignition Point of Fuels Depends on Rate of Heat Loss

Recent research work shows also that this temperature is higher with turbulent than with stagnant mixtures but that it varies little with mixture strength. Ignition point for blended fuels tends to be that of the most easily ignited component.

By H. T. Tizard[1]

IN a recent paper,[2] D. R. Pye and myself have described the results of further experiments on the ignition of fuels by the sudden compression of mixtures of their vapors with air. The paper referred to is concerned mainly with the bearing of the experimental results on the general theory of gaseous explosions. The results are, however, of direct interest in connection with the development of internal-combustion engines, and it has been thought that their summarization would be of value, together with a description of some further experiments which elucidate several points of special interest.

As a result of Ricardo's researches, a comprehensive knowledge has been attained of the characteristics of a large range of fuels for internal-combustion engines of the gasoline type. It is now known that certain types of fuel will detonate very easily, while others do not detonate even when used at compression ratios far higher than are at present advisable in practice. If any particular fuel be considered, it is fairly well established that the main factor which controls the occurrence of detonation is the maximum flame temperature. If under a particular set of conditions, detonation just occurs, then anything which tends to increase the flame temperature, such as heating the intake air, or raising the compression ratio of the engine, will make detonation more pronounced. On the other hand, anything which lowers the maximum flame temperature, such as cooling the intake air, or mixing with it inert gases of high specific heat, or injecting water or other inert liquids, will stop detonation. When the detonating properties of one fuel are compared with another, however, there is as yet no knowledge of any simple chemical or physical properties which enable us to predict their relative behavior in an engine.

Explanation of Detonation Inadequate

A good deal of empirical knowledge has been collected, such as that the paraffin hydrocarbons detonate easily, particularly those of high boiling point, and that aromatic hydrocarbons, and alcohols, are extremely difficult to detonate. No adequate explanation of these differences has, however, yet been put forward, nor does there yet seem any likelihood that this much needed advance in theory will be made in the immediate future. The matter is of very considerable importance, both theoretically and practically.

It was with the object of throwing further light on the question that a closer examination has been made of the phenomena which occur when mixtures of combustible gases or vapors with air are suddenly compressed. It is certain, however, that, although the measurement by such means of the ignition temperature of a fuel gives valuable information, particularly when too small quantities are available for full engine trials, yet the facility of detonation of any particular fuel cannot be foretold solely from a measurement of its self-ignition temperature. Two simple examples, which are dealt with in further detail below, may be quoted in support of this statement.

Self-Ignition Temperature Measurement

1—The self-ignition temperature of hydrogen is many degrees higher than that of benzol, although, as is well known, it detonates very easily in an internal combustion engine at low compression ratios.

2—The self-ignition temperature of a mixture of 50 per cent heptane with 50 per cent benzol is practically the same as that of pure heptane, although the mixture can be used in an engine at far higher compression ratios than can the pure heptane.

The apparatus used in the experiments was designed and constructed by Ricardo and was described in the paper he presented before the S. A. E. in 1922. See *Automotive Industries,* Jan. 19, 1922. Some refinements have since been added, which are described in detail in the paper quoted above,[2] and need not be discussed here. Briefly, the experiments are carried out as follows:—The mixture of vapor and air at a known temperature and pressure is suddenly compressed in a pre-arranged ratio, in a cylinder of 4 in. bore. A special device ensures that the piston is locked automatically in position at the top of the compression stroke. The variation of the pressure of the gas with time during and after the impression is recorded by means of a Hopkinson optical indicator fitted with a special timing device. This enables the moment when ignition takes place to be accurately recorded, a typical diagram being shown in Fig. 1. In this diagram A indicates the maximum pressure reached on compression, and B the point when ignition occurs. From the observed maximum compression pressure, the average compression temperature of the gas can be calculated if the initial temperature be known. Further, from other records of the rate of fall of pressure after compression when no ignition takes place, the rate of cooling of the gas can be determined.

The chief results of the investigations, so far as they are of direct interest in connection with internal-combustion engines, may be summarized as follows:—

1—The theory that the ignition temperature under these conditions is that temperature at which the slow combustion of the fuel vapor with air evolves heat at a slightly greater rate than it is being dissipated by con-

[1] Reprinted from the *Automobile Engineer.*

[2] *Philosophical Magazine,* 1922. Vol. xliv, p. 79. See also Tizard, "Trans. N. E. Coast Institution of Engineers and Shipbuilders," May, 1921.

duction, etc., is shown to be quantitatively in accordance with the facts. The simplest and most effective method of showing that the ignition temperature depends on the rate of loss of heat is to compare the ignition temperatures of turbulent and stagnant mixtures. Sufficient turbulence can be obtained by fitting a small internal fan to the cylinder, and rotating it at a high speed during and after the compression. Under these conditions the rate of loss of heat is very much greater than if the gas be stagnant; in our experiments it was about three times as great. It is invariably found that the ignition temperature of a turbulent mixture is correspondingly higher than that of a stagnant mixture, as the following figures show:—

	Minimum Ignition Temperatures				Ratio of Loss of Heat With Fan to That Without
	Without Fan.		With Fan.		
Substance	C. Deg.	F.	C. Deg.	F.	Fan
Heptane	280	536	307	584	2.90
Ether	212	413	235	455	3.08
Carbon bisulphide	253	487	300	572	3.40

Such experiments enable the effect of temperature on the rate of combustion to be approximately calculated. Thus it needs a rise of 27 deg. C. (48.6 deg. Fahr.) to increase the rate of combustion of heptane by 2.9 times, but a rise of 47 deg. C. (84.6 deg. Fahr.) is needed to increase the rate of combustion of carbon bisulphide 3.4 times. When reduced to a common basis, the above data can be expressed in the form that the approximate percentage increase in absolute temperature necessary to double the rate of combustion is 3 per cent in the case of ether and heptane, and 5 per cent in the case of carbon bisulphide.

2—The influence of temperature on the rate of combustion can also be obtained from measurements of the delay before ignition takes place at compression temperatures above the minimum ignition temperature. Such measurements closely confirm the figures deduced from the different ignition temperatures of stagnant and turbulent mixtures. Strictly speaking, if the temperature of a gas after compression were uniform throughout, one would expect combustion at the minimum ignition temperature to go on slowly until all, or nearly all, the fuel was burnt.

Actually such a condition is difficult, if not impossible, to obtain; but long delays, of half a second or over, are frequently observed when the compression temperature is only slightly over the minimum ignition temperature (see Fig. 1).

The effect of an increase in compression temperature is to shorten these delays, and if the observed delays be plotted against compression temperatures, curves are obtained the shapes of which depend upon the effect of temperature on the rate of combustion, i.e., on the so-called temperature coefficient. The lower the temperature coefficient, the flatter is the delay curve. Fig. 2 shows the delay curves for heptane, ether, carbon bisulphide and hydrogen.

Heptane Detonates Easily

The chief point of interest to note is that the curve for carbon bisulphide crosses that for heptane at quite low temperatures. Hence, though the ignition temperature of carbon bisulphide is lower and its rate of combustion undoubtedly considerably higher than that of heptane at temperatures below 280 deg. C. (536 deg. Fahr.), yet at slightly higher temperatures, namely, above 300 deg. C. (572 deg. Fahr.), its rate of combustion is lower than that of heptane. As the temperature of compression is increased, the difference becomes still more marked. From the temperature coefficients deduced from these results, it can be calculated that at 500 deg. C. (932 deg. Fahr.) the rate of combustion of heptane will be something like seven times, and at 1000 deg. C. (1832 deg. Fahr.) seventy times that of carbon bisulphide. The comparatively small temperature coefficient of carbon bisulphide makes it easy to understand why heptane detonates so much more easily in an engine, in spite of its higher ignition temperature.

In practice, carbon bisulphide cannot be made to detonate; on the contrary, if it be added to an easily detonating gasoline, it actually stops the detonation. If used as a fuel in the pure state, it pre-ignites at compara-

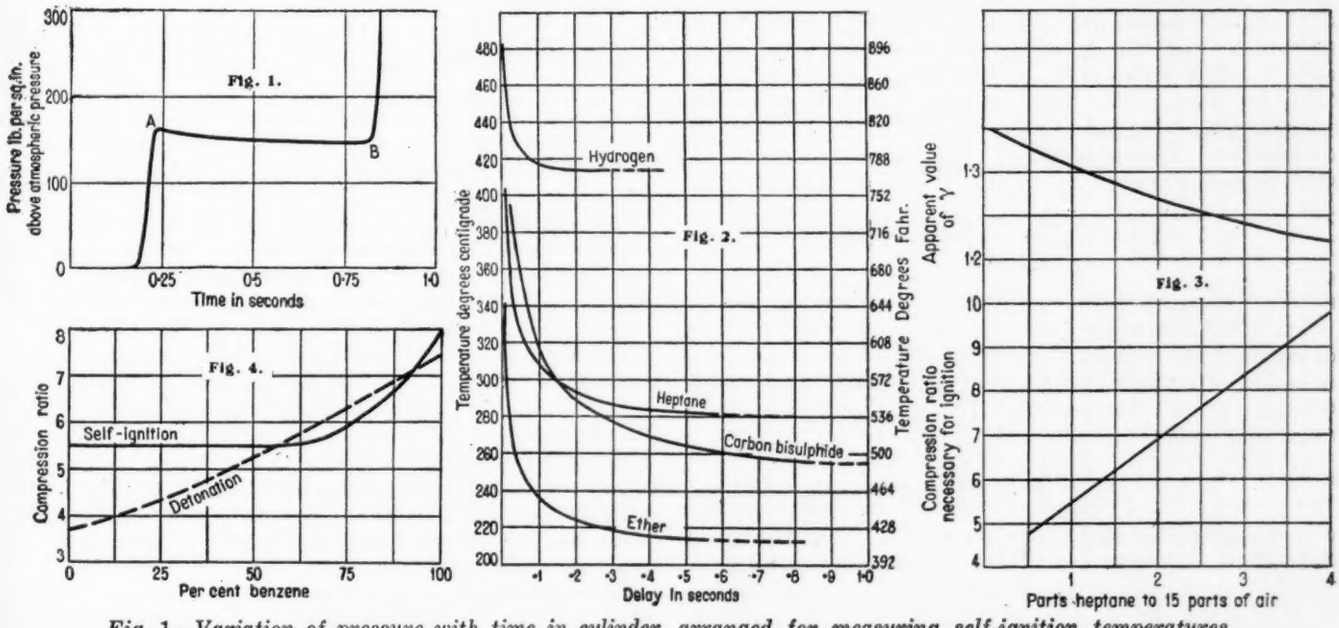


Fig. 1—Variation of pressure with time in cylinder arranged for measuring self-ignition temperatures. A is point of maximum pressure at end of compression. B the point at which ignition occurs. Fig. 2—Curves showing effect of ignition temperature on rate of combustion. Fig. 3—Upper curve shows variation in the apparent value of the ratio of specific heat at constant pressure to the specific heat at constant volume with change in mixture strength. Lower curve shows degree of compression necessary to ignite different strengths of mixture of heptane and air. Fig. 4—Effect of benzol content on self-ignition and detonation of a mixture of benzol and heptane with air

tively low compression ratios. This would be expected from its low ignition temperature.

The same kind of relation holds good between heptane and hydrogen, although it is not so obvious, since the delay curves do not cross within the range of compression temperatures reached in the experiments. From the results, however, it can be shown that the temperature coefficient of the combustion of hydrogen is higher than that of heptane, so that at high temperatures its rate of combustion is also higher than that of heptane, in spite of the fact that the minimum ignition temperature of the latter is so much lower. This accounts for the fact that hydrogen detonates so easily, and at the same time it illustrates very clearly, as pointed out above, that the ignition temperature alone is not a sufficient criterion of the tendency to detonate; the temperature coefficients must also be taken into account.

Combustion of Hydrogen Studied

The combustion of hydrogen on sudden compression presents many interesting features. It will be more thoroughly investigated in a modified apparatus now under construction. The heptane and ether curves are very similar, and their temperature coefficients are the same within the experimental error. So far as experiments have gone, it would appear as though all hydrocarbon fuels, and also such compounds as alcohols, ether, acetone, etc., have the same, or nearly the same, temperature coefficient. The order of the ignition temperatures of these substances seems to correspond exactly with the order of their tendency to detonate, *provided such fuels are used in the pure state.* It does not follow, however, that the ignition temperatures of mixtures of such fuels in all cases correspond to their tendency to detonate. (See paragraph 4 below.)

3—It is an interesting fact that the ignition temperature of a mixture of a fuel vapor with air varies very little with the strength of the mixture over a wide range. Thus the ignition temperature of a mixture containing less than half the amount of heptane necessary for complete combustion is practically the same as that of a mixture containing four times the amount. The specific heat of the mixture, of course, increases with the proportion of fuel present, so that the actual degree of compression necessary to effect self-ignition is higher for strong mixtures than for weak. The upper curve in Fig. 3 shows the variation of the apparent value of $\gamma = c_p/c_v$ with strength of mixture. This is obtained from measurements of the compression pressure by means of the well-known relation:

$$\frac{\text{Compression pressure}}{\text{Initial pressure}} = r^{\gamma}$$

r being the compression ratio.

The (lower) straight line in the figure shows the degree of compression necessary to ignite different strengths of mixtures of heptane and air, the initial temperature being 60 deg. C. (140 deg. Fahr.). The ignition temperatures calculated from the expression

$$\frac{T_{max}}{T_0} = r^{\gamma-1}$$

do not appreciably vary; they are within a few degrees of 280 deg. C. (536 deg. Fahr.) for any strength of mixture. The initial temperature in these experiments was 59 deg. C. (138 deg. Fahr.).

It may be observed here that, owing to the high specific heat of a rich mixture, the effect of enriching the mixture in an engine is to lower the compression temperature, and therefore also the flame temperature. This is the chief reason why enriching the mixture tends to stop detonation, provided, of course, that the mixture to start with is not much weaker than that necessary for complete combustion.

4—One important deduction follows at once from the observation that the ignition temperature varies very little with the strength of the mixture. It is that the ignition temperature of a mixture of fuels must tend to be that of the most easily ignited constituent, provided this is not present in too small a proportion. This deduction has been confirmed by some experiments made by Mr. Alcock, who measured the ignition temperatures of mixtures of benzol and heptane. In these experiments, as the proportion of total fuel to air was kept constant throughout, the specific heat of the gaseous mixture did not alter appreciably, so that the degree of compression necessary to effect ignition is a direct measure of the ignition temperature. Fig. 4 shows his results, and it will be noted that the addition of 50 per cent benzol to heptane has no effect on the ignition temperature. It is only when the proportion of benzol is over 3 to 1 that the ignition temperatures begin to rise sharply up to the point for pure benzol. This is exactly what would be expected from the results given in paragraph 3.

The dotted curve in Fig. 4 shows, on the other hand, the results obtained by Ricardo in measuring the compression ratios at which detonation occurred when using mixtures of heptane and benzol in his variable compression engine E35. In this case, the addition of benzol has a continuous effect; the curve, in fact, is almost a straight line between the two extreme points. Hence the ignition temperature of a mixture cannot be taken as representing its ease of detonation.

Theory of Alloy Microstructure

REFERRING to the great accumulation of facts in regard to the properties and microstructure of alloys which have been forthcoming in recent years, Dr. W. Rosenhain, in a meeting before the Institute of Metals, said that the time had arrived when it was most desirable that there should be found a key to this maze of knowledge in the form of a general theory.

Such a theory Rosenhain attempted to put forward, basing it upon the intimate knowledge of crystal structure which had recently been acquired by means of the application of X-rays to the study of the arrangement of atoms in crystals. The crystal structures found in pure metals became modified in the case of alloys, particularly in those called solid solutions, where a second kind of atom, the atom of the alloying element, entered into the structure of the crystal and produced in it certain minute changes.

With regard to such changes the lecturer put forward two simple principles and was then able to show a striking series of inferences from his theory, which accorded closely with a large number of experimental facts.

Connections between various series of properties in metals and their alloys were established which had not formerly been recognized, such as the relation between hardness and alloying power. Especially important is the connection between the minute distortion of crystal structure which occurs in alloys and their behavior on melting and freezing, while such phenomena as plasticity, diffusion and others fell easily into line with the same type of explanation.

Most important of all, perhaps, is the fact that this new theory of alloy structure affords a ready explanation of the electrical properties of metals and alloys and the changes of those properties when the metal is heated or cooled. These explanations cover the mysterious phenomena of super-conductivity found in many metals when cooled nearly to the absolute zero of temperature.

Uniform Traffic Laws Urged at Road Congress

Motor vehicle recognized as essential unit in transportation. Subsidies approved by delegates from countries eager to supplement railroad facilities. Highway construction discussed.

SEVILLE, SPAIN, May 15 (*Special Correspondence*)—Recognition of the motor vehicle as an essential unit in transportation and resolutions calling upon the governments of the world to facilitate the use of the vehicle by adoption of uniform laws and by subsidy of public lines where necessary, were the outstanding acts of the fourth meeting of the Permanent Association of International Road Congresses held here May 7 to 12.

In the closing days of the session, a formal invitation was received from Premier Mussolini of Italy asking the delegates to hold their next meeting two years hence in Italy. The invitation was passed along to the executive committee which, it is anticipated, will act on it some time either in the closing months of the present year or early in 1924.

Because of the fact that the United States Government has not yet officially joined the congress, no official invitation could be extended from the United States, but those present from that country urged that action be delayed until Congress has had an opportunity to indicate its attitude toward the Road Congress at the coming session.

No official representatives were present from the United States but America was represented by Major W. W. Crosby, National Park Service, Samuel Hill, one of the founders of the Congress, Pyke Johnson, National Automobile Chamber of Commerce, Col. Bowlbey, American Road Builders Association, Prof. Leonard Hill, University of Wisconsin, Dr. W. K. Hatt, National Research Council, Major Connolly, unattached, and Arthur Hall of the Consolidated Gas Companies, New York.

Some 600 delegates attended from thirty-seven countries, a preponderance of those present, however, being from Western Europe.

Six questions were reported on as follows: Concrete construction, asphalt, laying of tram rails on highways, development of motor transport, traffic rules and regulations and traffic in congested city areas. In each case printed reports were received from experts from many countries, including those of the United States.

These reports were turned over to general reporters prior to the convention and were digested by them. The convention then acted only upon the conclusions drawn from the reports by the reporters. Because of the fact that the meeting was held in Spain, all of the general reporters were named from that country. In consequence the resolutions as presented were largely a reflection of highway transport conditions in Spain including, for example, such resolutions as one which would provide that traffic should pass in a given direction only on one side of the street.

In Nations like England, France or America, such a resolution appears unnecessary but to the newer users of motor transport, it marked a new advance which brought forth a good deal of debate.

The suggestions of subsidized motor lines came again from Italy and Spain and other continental countries where, unlike the practice in the United States, the governments have been actively interested in furthering the development of highway transport where railroad facilities have been inadequate.

THIS story gives news of the fourth meeting of the Permanent Association of International Road Congresses which took place at Seville, Spain, last month.

Delegates from thirty-seven countries evidenced the keen, world wide interest in motor transport development, adoption of uniform traffic laws and expansion of highways. They proved that the motor vehicle is now recognized everywhere as an essential unit of transportation.

Many of the resolutions acted upon would be considered elementary in this country, but they hold out promise of international progress in the near future.

Resolutions calling for definite weight allotments per axle in proportion to definite total loads were passed after a sharp contest by American delegates, who insisted that experimental work had not yet proceeded to a point where it was possible to say positively what these percentages should be. The resolutions were modified to read as "provisional standards."

The question of the rule of the right in traffic was another issue which precipitated a tilt, the English delegates insisting upon the right of way for the main road as required by judicial practice in their own country. This resolution was also considerably modified, final action calling for an international conference to consider uniform markings for main streets, meanwhile suggesting the rule of the right.

THE resolutions dealing with construction also contained many provisions which take up the work at its inception, setting down methods of procedure which have been generally settled for some time in countries of more advanced road construction.

The convention served to indicate very clearly that practically every country in the world is now interested in motor transport and that the use of motor vehicles undoubtedly will increase materially. Markets for all automotive products will increase accordingly.

During the convention the delegates were liberally entertained by their Spanish hosts, receptions, bullfights, dances, opera and other events following one another in rapid succession. Later the party was sent on excursions to Granada and Cordova.

Most of the American delegates are remaining in Europe for varying periods, some of them to study transport conditions in other European countries and the rest to take short sight-seeing trips.

Automotive Use of Copper and Brass Increasing Constantly

Approximately 144,000,000 pounds consumed in 1922. Gain of fifty per cent over previous year. Stabilization of prices will permit metal to be used more widely. Is particularly adapted to exposed trimmings. New possibilities developed.

By William Crawford Hirsch

ACCORDING to figures recently made public by the American Bureau of Metal Statistics, the automotive industries consumed in 1922 145,600,000 lb. of copper, exclusive of the metal that went into electrical manufactures of an automotive character. Undoubtedly much of the copper listed as having been consumed in other manufactures, such as, for instance, bearings and bushings (42,000,000 lb.) and in manufactures for export (81,172,000 lb.) might properly be added to the tonnage consumed by the automotive industries. Consequently, 200,000,000 lb. would appear to be a conservative estimate of the annual consumption of red metal by automotive manufacturers.

The really interesting feature of the American Bureau of Metal Statistics figures would seem to lie, however, not so much in its totals as in its comparisons with preceding years, as follows:

	1922	1921	1920	1919
Automobile (exclusive of electrical manufacturers) ...	144,000,000	92,000,000	120,000,000	97,000,000
Auto brake lining	1,600,000	1,400,000	1,150,000	900,000

The increase of approximately 50 per cent in the 1922 copper consumption of the automotive industries over that of 1919 is all the more impressive when contrasted by the records of other industries. Consumption of copper by manufacturers of electrical goods was less in 1922 than in 1919, that in building construction increased only 20 per cent, and that in commercial shipbuilding fell off approximately 94 per cent.

The foregoing figures furnish the best possible proof that the merits of copper and its principal alloys, brass and bronze, outstanding among which are resistance to rust and corrosion, and high electrical conductivity, are well understood by automotive designers and builders.

The Copper and Brass Research Association made the statement in one of its recent bulletins that "automobiles of pre-war days carried more copper, brass and bronze than do those of today," ascribing this to the war-time substitution of other metals forced upon consumers by the restrictions placed upon the commercial use of copper by the Government because of its own war needs. It would seem, however, that this observation is based rather upon the more spectacular demand for low-priced passenger motor vehicles in the last few years than upon an actual curtailment in the use of copper and its alloys in the higher-priced cars. Even in low-priced cars, however, the consumption of copper and its alloys is on the increase at the present time.

Greater stabilization of the copper market should go far toward broadening the use of copper and its alloys in the automotive industries. There is little question that the wide fluctuations in copper prices in 1919, when the red metal leaped from a 14¾-cent level in March to 23½

AUTOMOTIVE parts which can be made from copper, brass and bronze. List suggested by Copper and Brass Research Association.

BRASS

- Brake drums
- Brake lever grips
- Carburetor
- Door handles and fittings
- Door locks
- Gear Shift and emergency
- Hub caps
- Hinges and fasteners
- Lamps
- Priming cocks
- Radiators
- Radiator caps
- Radiator shells
- Running board edge
- Screws, nuts and bolts in fittings, trim and accessories
- Steering post cover
- Tank filler cap
- Windshield frames

BRONZE

- Brake rod bushings
- Bronze-backed main bearings
- Bushings in springs
- Bushings in top
- Bushings for pins, spindles and rods
- Small gears
- Sector or nuts in steering gear
- Water pump

COPPER

- Gasoline tank
- Gaskets
- Insulated wiring
- Gasoline piping
- Radiator

cents in July, and to some extent in 1920, when the spread between the year's high and its low was nearly 7 cents, proved discouraging to many prospective users. Relative stability of the copper market is perhaps of greater importance in its bearing upon the use of the metal and its derivatives in the automotive industries than the price itself, which, of course, must be reasonable. At this writing prices for copper, brass and bronze are particularly attractive and, although a rebound from these low levels must be anticipated, the situation as a whole seems to have reached a point where consumers may look for a more settled state of values.

It is especially in the exposed trimmings that the use of brass has special merit. When nickel coating peels off a steel trimming, the appearance of the car is marred. Amid certain atmospheric conditions the wear on rust-retarding coatings imposed on steel is relatively very much more rapid than the wear on the car's mechanism. Of course, the whole question simmers down to one of dollars and cents. It is obvious that a car which must be sold at a certain price does not permit of the unlimited use of the highest-priced material. It is possible, however, that some parts, especially those which are always in view and which, if defaced, invite unpleasant criticism, can be most profitably made of brass. The prestige of the highest-grade mechanical product may suffer from such premature defacement so that not to obviate it would be penny-wise and pound foolish.

During one of the periods when the copper industry suffered seriously from a lack of demand, one of the Western producers made extensive experiments with a view to turning out radiators direct from the refinery copper. Nothing in the way of definite results has so far come to the trade's attention. One producer of cartridge tubes, however, turned his war experience to good use by adapting the extrusion process to the manufacture of a "honeycomb" type automobile radiator which permits the removal of any damaged tube and of its replacement with a new one, an application of flux and soldering iron being all that is necessary. It was also while the copper industry was in the doldrums that a movement was started to introduce license plates made of copper. Michigan, being one of the leading copper producing States, sought in this manner to aid the industry. With the recovery of the copper market the project fell through, however, it being generally conceded that for the one year's use of license plates copper is too good a metal.

Within the brief limits of this article it is impossible to discuss the many different kinds of brass, bronze and kindred alloys. It should be emphasized, however, that there is good brass and poor brass, just as there is good steel and poor steel. A brass that is improperly alloyed, a brass casting that is defective or a brass sheet that has not been properly annealed, may or rather will surely develop shortcomings in use that will more than offset the superior qualities of the alloy as a whole.

Gear Manufacturers Association Reports Automotive Activities

A BRIEF outline of the work accomplished by the sub-committees of the American Gear Manufacturers' Association since October, 1922, has just been announced. Their activities covering the automotive field are given as follows:

The Spur Gear Committee has been working on rules for the strength of gears, as well as a spur gear nomenclature. As each chairman of a committee is a member of the Nomenclature Committee, each group feels itself called upon to adopt or develop a nomenclature to suit its individual need.

The Bevel Gear Committee has added to its previous recommendations a "Suggested Standard for Future Design for Bevel Pinions of Ten Teeth or Less" and a nomenclature for bevel gears covering most every item in practical use. This nomenclature, together with that submitted by the Spur Gear Committee to the Sectional Committee, has permitted the latter to give the subject a great deal of attention and it has accepted some 60 definitions which will be acted upon at the association meeting in the fall.

The Worm Gear Committee has worked up a recommended practice for the proportions of worms and worm wheels for single, double, triple and quadruple threaded worms where the worm would have a hole and the face of the wheel would be the maximum for efficient service. It also offers rules for calculating the proportions for wheels for existing hobs.

Working in close conjunction with the A. S. M. E. and the S. A. E. committees, the Sprocket Committee has been developing a standard for roller chains and presented quite an extensive progress report at the last meeting in April.

Means for the measurement of gear noises is being studied by the Inspection Committee.

The Metallurgical Committee has submitted a progress report, consisting of a recommendation for the treatment of the various gear steels together with photo-micrographs to accompany the recommendations for heat treatment. It has also made a recommendation for the spark test of steels. These recommendations may be acted upon at the fall meeting.

The Herringbone Committee has under consideration recommended practice for using standard spur gear hobs for the cutting of herringbone gears.

Progress has been reported by the Keyway Committee, which has been in close touch with the A. S. M. E. Committee on shafting.

A nomenclature has been offered by the Differential Committee, which has been working in cooperation with the S. A. E. committee.

A standard tooth stub has been under consideration by the Tooth Form Committee, but as yet no recommendations have been made.

Aeronautical Bibliography Issued

A "BIBLIOGRAPHY OF AERONAUTICS, 1917-1919," covering the literature published from Jan. 1, 1917, to Dec. 31, 1919, has recently been issued by the National Advisory Committee for Aeronautics.

This volume continues the work of the Smithsonian Institute issued as volume 55 of the Smithsonian Miscellaneous Collections. Delay in the publication of this bibliography is due to the interruption in international exchanges during the war and similar post-war delays in securing material considered confidential.

Safety and Comfort Chief Essentials in Passenger Airplane Design

Space usually provided for eight or ten seats. Sleeping berths will be required in future. Doors should be large enough to accommodate persons of average size. Refinement of fittings tends to promote public confidence. Proper ventilation needed.

By Archibald Black

DURING the past few years there has been some crystallization of opinion regarding certain major features of commercial airplane design. Present airplanes for transport of passengers on a commercial scale are usually provided with 8 or 10 seats. Placing the pilot in front of the passengers is gradually becoming standard practice, while speeds range around 100 to 110 miles per hour, the water types being somewhat slower than this.

Much yet remains to be accomplished, however, in the way of increasing the comfort of passengers.

In the design of passenger cabin seats should be provided which are comfortable, roomy, and so placed as to permit some conversation. Recent designs indicate growing appreciation of this need and the most popular seat at present is the individual wicker arm chair, which may be regarded as a very suitable type from the viewpoints of both comfort and weight if properly designed. All seats must be fastened down to the structure and must have some provision, such as arm rests, which the passenger can grip when necessary and which may be regarded as taking the place of the safety belt which would be furnished were the cabin not closed. Safety belts are unnecessary in closed cabins and their provision only tends to alarm the passengers. Each passenger should have access to a window through which he can look in comfort and, preferably, which he can open slightly if desired. In the case of biplanes, it will often be found difficult to give certain of the passengers a view of much more than the lower wing, a disadvantage which should be avoided where possible.

With some exceptions the question of avoiding "airsickness" seems to be largely one of proper ventilation and of giving the passenger something to occupy his or her attention. Thus the provision of comfortable seats, some range of vision and adaptability of the seating arrangement to the maintenance of conversation may be regarded as helping to attain this end. It is, of course, understood that the engine must be sufficiently silenced to make conversation at least possible, if not comfortable. The noise of the unsilenced exhaust of an airplane engine has a terrifying effect upon the novice, and its eliminaton, so far as possible, is an important requirement.

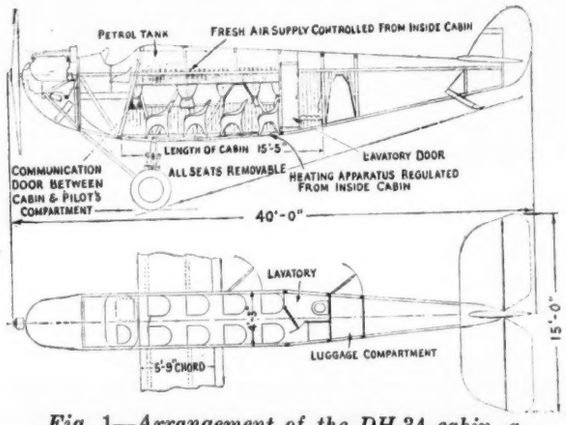


Fig. 1—Arrangement of the DH-34 cabin, a typical passenger design

Width of Seats

Street car and railroad experience shows that seats should allow a width of at least 18 in. per passenger (preferably more) and that they should be spaced at least 30 in. from back to back in the row. Some buses have been built with seating arrangements worked out to lower figures than these because the designer sacrificed comfort to revenue. In the commercial airplane the fare will be high and the passenger will feel justified in demanding comfort, so the figures given should be regarded as absolute minimums. The aisle between seats may be quite narrow, 12 to 15 in. being sufficient, provided that the backs of the seats are cut away to avoid interference with those passing through. It is quite possible to walk with comfort down a very narrow aisle if the narrow portion is not much higher than the knees.

The cabin should be designed entirely free from cross bracing if possible. This usually can be done, but if bracing is necessary it must be arranged to permit passing through comfortably. The same principle may be applied as in the seat arrangement—that of narrowing only the lower part. Thus the diagonal cross bracing might be arranged in the form of a V with the apex sufficiently below the floor to permit leaving about 8 or 10 in. of continuous floor between the diagonals. It is really surprising to note how little inconvenience is felt in passing through such bracing as compared with the type where it is necessary to bend down. This type of bracing has been used in some airship cabins to date. In locating the passenger cabin it is good practice to provide a space, such as baggage space, between the engine compartment and the cabin. Thus, in event of an accident, there is additional possibility of the shock being absorbed without serious injuries to the passengers.

There has been quite a marked tendency to provide doors of either poor shape or limited dimensions, or both, in order to permit the retention of conventional trussing of the structure. This should be avoided. All doors, through which passengers have occasion to pass, should be so designed that they can be used in comfort

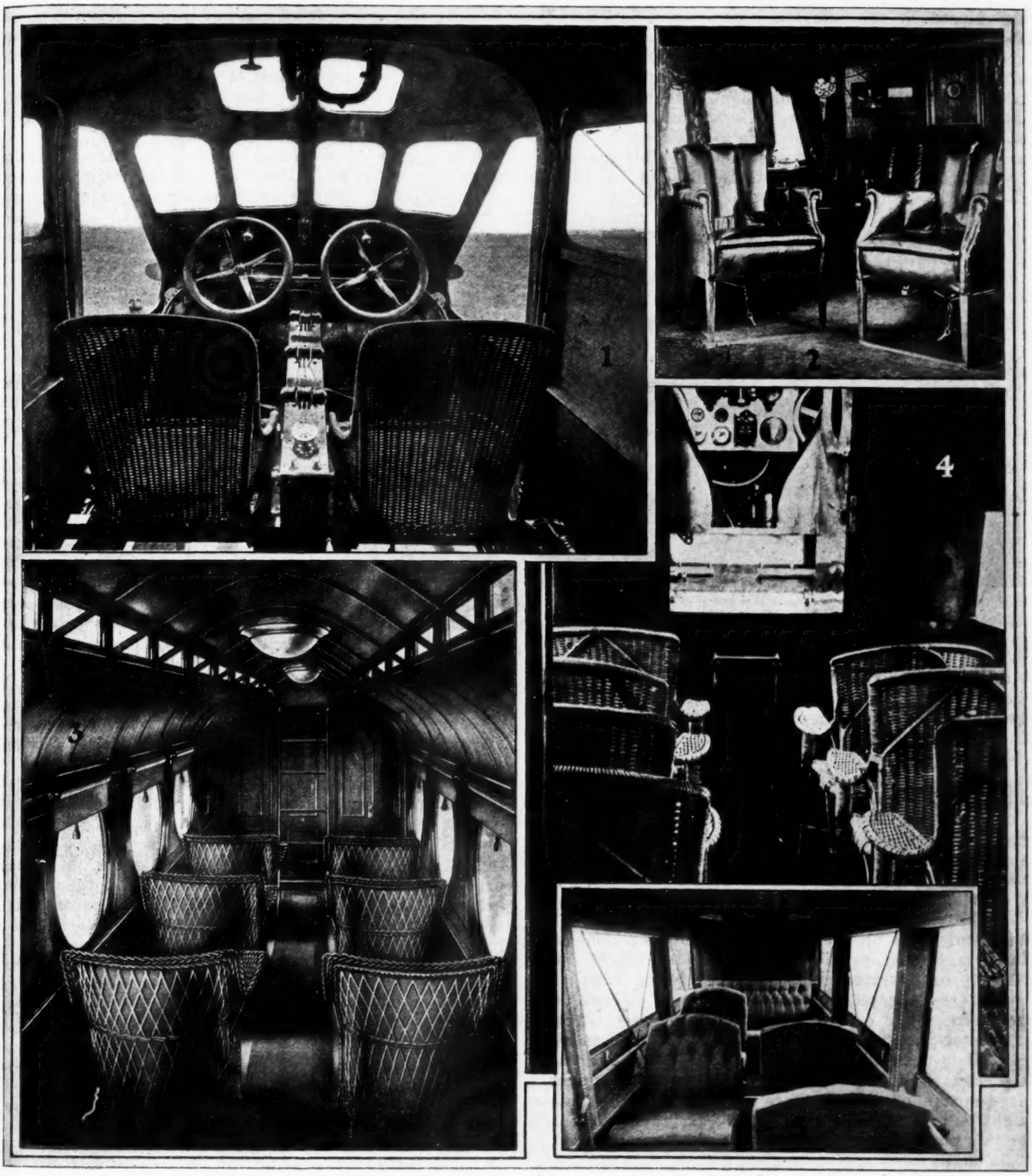


Fig. 2—A group of typical interiors: (1) *pilot's compartment of the Curtiss "Eagle,"* (2) *Aeromarine passenger cabin, an excellent example of utility and refinement,* (3) *cabin of the Fokker F-5,* (4) *the cabin of the DH-18, a pioneer commercial type,* (5) *the Fokker F-3 cabin*

by persons of average size. In many cases, where the structure would otherwise interfere with the door, it will be found that the conventional strut-and-wire or all-strut truss may be replaced with a structure of a material such as plywood through which the stresses may be carried indirectly if necessary. Thus large fillets in the corners may be used in place of diagonal members. It usually develops that a stepladder is necessary to reach the entrance door from the ground, and where such ladder is required it should always be carried with the machine, preferably fastened permanently in place. The cabin doors, or for that matter any doors in the outside of the body, should always be designed to open facing backwards. All outer doors of the cabin should be provided with some safety fastening which makes it impossible for the passengers to accidentally open them.

Even though complete control of ventilation is provided otherwise, the use of windows which can be opened

and closed by the individual passengers is desirable. This presents a ready means of individual control of ventilation while in motion and also a very simple means of providing adequate ventilation when the machine is at rest on the ground and, consequently, the regular ventilating system is inoperative. Windows of the sliding and of the hinged types have each been used in various passenger designs, the former being possibly preferable because their use is not interfered with by the air current.

In connection with this question of ventilation it should be remembered that "airsickness" (in ordinary flying) came into existence only with the advent of the closed cabin and that it is undoubtedly due, in a large measure, to poor ventilation. The passenger who is susceptible to this malady, if given accessibility to a

Fig. 3—The Remington Burnelli, an interesting experiment in the effort to increase cabin size

window which he or she can readily open, will probably prefer the discomfort of a violent rush of fresh air to the nauseating sensation engendered by the confinement. Those who are subject to seasickness will recollect vividly the great relief afforded by the cold, fresh breeze on deck, a condition very similar. Some toilet facilities should be provided in all of the larger passenger cabins, a closet of the farm building type being the customary installation.

As the regular door provided for entrance and exit in passenger machines is liable to become jammed in case of an accident, it is very desirable that some other means of quick exit be provided. This might consist of an emergency door on the top of the cabin, or some similar arrangement, provided with fastening means which can not be operated unintentionally. The emergency door is best located in the roof because it facilitates escape in case of a landing on water when so arranged.

To assist in floating the body of the plane in such cases it is desirable to make the lower part and doors watertight. Since life preservers are required where large spaces of water are to be flown over, cushions might be provided for all seats and designed to be used for this purpose in emergency.

Cabin Design

Sides, top and bottom of passenger cabins should be designed and constructed to protect the passengers so far as possible in case of accident and also to transmit the sound of the engine as little as possible. Plywood appears to adapt itself well to such uses and it is quite generally favored by present designers for this and other reasons. It may be also used to replace wiring in the body.

A definite connection exists between refinement and public confidence in passenger airplanes. The passenger entering a carefully designed and furnished airplane cabin is inspired with a confidence which is invaluable to the building up of this class of traffic. The fine tapestry hangings, period candelabra and flower vases seem to inspire a feeling of safety, as if the constructor would never spend so much time on beautifying any vehicle in imminent danger of being destroyed in an accident. It is desirable, therefore, to give particular attention to the finish of the interior.

The custom of providing curtains for all cabin windows is popular, while in some cases the walls are lined with whipcord, light tapestry or similar materials presenting a very attractive appearance. In other cases mirrors or pictures are fastened to the walls. By the use of some judgment in the design of the interior and in the materials used it is possible to make the cabin most attractive without excessive weight.

The question of maintenance cost must be kept in mind at the same time, as certain materials might be used which would require replacement every few months. All windows should be provided with shades which may be drawn down by the passengers as desired to protect their eyes from bright sunlight.

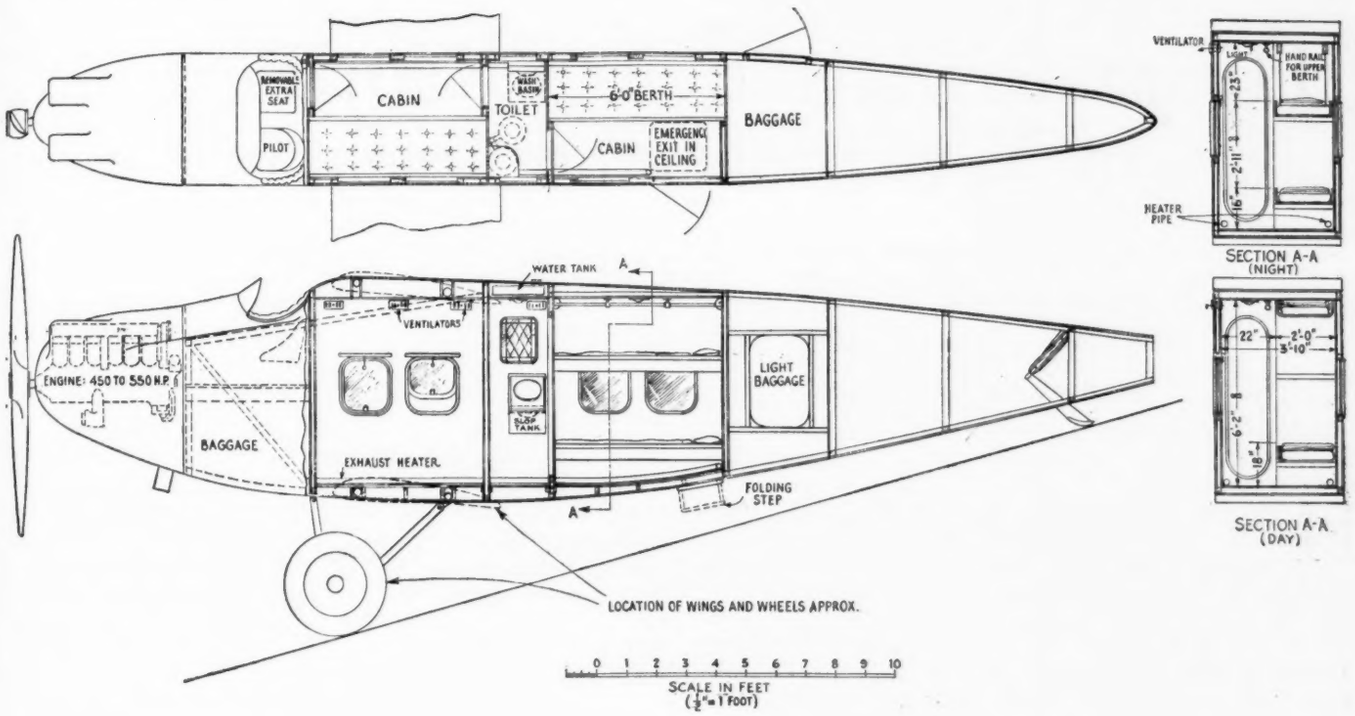
Heating and Ventilation

Heating and ventilation are so closely related that they must be considered simultaneously in the work of design. In a paper presented before the Royal Aeronautical Society on Jan. 5, 1922, Wing Commander W. D. Beatty discussed these questions so thoroughly that there seems little, if anything, left to add. Commander Beatty discussed the theoretical volume of air required to keep the interior of the cabin fresh and showed the impracticability of obtaining sufficient air changes to attain this condition in present cabins without an unbearable draft. He recommended that designers aim to provide about 20 air changes per hour for the customary type of cabin with adequate control so that this may be reduced to as little as desired and that ventilators be provided for both incoming and outgoing air.

The suggestion is made that the intake vents be located at the front of the cabin, near the roof, while the outlets be located a short distance above the floor. Attention is called to the importance of keeping the incoming air free from exhaust gases and similar impurities or odors and the suggestion is made that the air be heated by a small radiator as it enters the cabin. Exhaust heat being conveniently available, should be used for keeping the cabin at comfortable temperature. This may be applied in the manner suggested by Commander Beatty or in the simpler method of carrying a heater pipe through the cabin near the floor. The heating system, as well as the ventilating system, should be under control of the passengers and not the pilot as is the case in some designs. Individual control of ventilation is very desirable, as previously mentioned, if airsickness is to be avoided by those passengers subject to nausea. The problem of ventilation, without uncomfortable drafts, is greatly aided by increasing the size of the airplane body which is, at present, uncomfortably small in most cases.

Provision of sleeping berths in airplanes might appear as being far in the future were it not a fact that these are actually in use in an isolated case of an airline in Europe. As a matter of fact, if the airplane is to save time over the railroad on trips, such as from New York to Chicago, it will eventually be necessary to equip some passenger machines in this manner. Having this in mind it seems advisable to give the matter some attention here.

The chief problem involved in providing sleeping berths is caused through the limited space available in the body. Fig. 4 shows a study of a possible sleeping



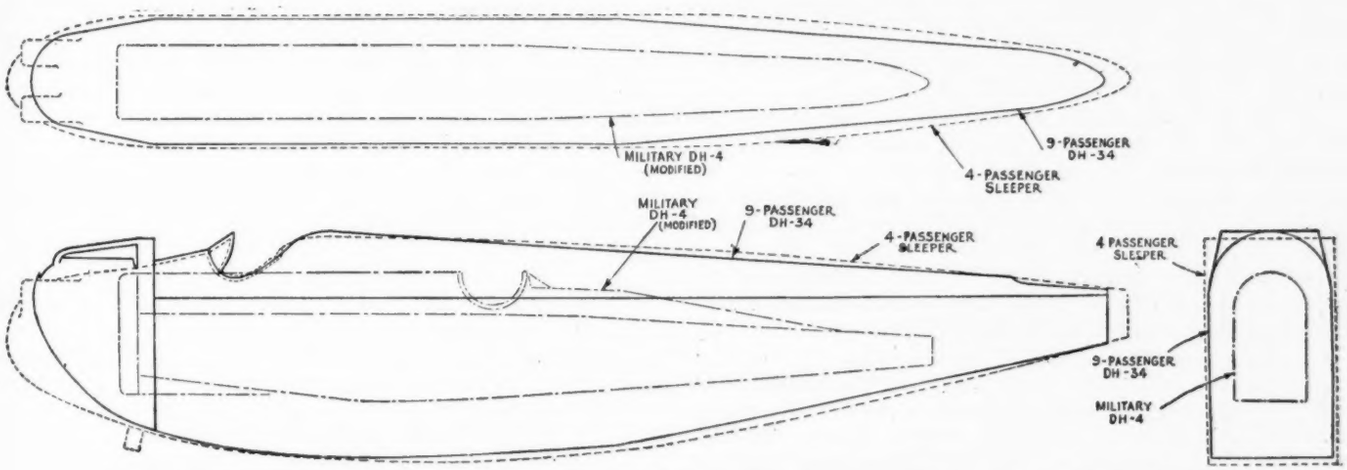


Fig. 4 (*top*)—*Study of arrangement of body for a* 4-*passenger sleeper airplane.* *Fig.* 5 (*bottom*)—*Comparison of passenger airplane bodies with that of the military DH* 4

berth arrangement which was made to show the possibilities. Every effort has been made to utilize space to the utmost advantage, yet only four persons can be provided for in the sleeper as compared with the 8 to 10 that could be comfortably seated in the same space. To illustrate the difficulty of further increasing the size of this body, its outline has been super-imposed upon that of the DH-34, a 9-seater passenger type, in Fig. 5. The outline of a DH-4 (modified model), which uses almost the same size of engine, has been also shown for purposes of comparison. Marked though the increase in size is, commercial bodies are yet very crowded and wind tunnel tests of still larger types are necessary in order that some of large size but reasonable resistance may be developed.

A Sample Layout

Fig. 4 requires but little explanation other than that given on the drawing. Two compartments are provided, with a toilet between them which can be used by the occupants of either. To economize in space and to remove any objections to the use of the space as a passage at other times, each of the facilities provided is arranged to swing out of the way into a covered position.

The upper berths are arranged to be raised up to the ceiling when not in use, being carried by cables on spring balanced rollers. The lower berth is permanently located and is used as a seat during the day, while cabin baggage may be kept on the floor below it. The arrangement shown could be changed to provide for eight people by widening the body about 12 in. and providing 3-ft. berths for the use of two persons.

Such an arrangement, however, is not a practical one for several reasons. The space allowed for occupants to dress in would be most uncomfortably limited, the berths would be too small for two people and the crowding of four into one compartment would be very undesirable.

This possible increase in capacity is mentioned to show that the design of sleeper airplanes which can carry a real pay load will be a very important problem when we get to it. It seems to indicate, just as so many other requirements have done, the necessity of developing bodies which are much larger than even our present commercial ones and yet which have not much more resistance.

Hydraulic Operation of Ram Feature of New Broaching Machine

Gear driven screw feed has been replaced. Variable pressure pump supplies oil pressure. Useful life of broaches prolonged. Broad range of speeds and feeds provided. Draw head, mounted on forward end of piston rod, has vertical adjustment of 1⅝ in.

HYDRAULIC operation of the ram has increased both cutting and return speeds in the latest broaching machine development of the J. N. Lapointe Company. The gear-driven feed screw has been replaced by a piston and hydraulic cylinder of 6-in. bore and 56-in. stroke. Oil pressure is supplied by a constant speed, variable pressure pump of a type similar to that used in naval practice for gun elevation and operation of turrets and steering gear.

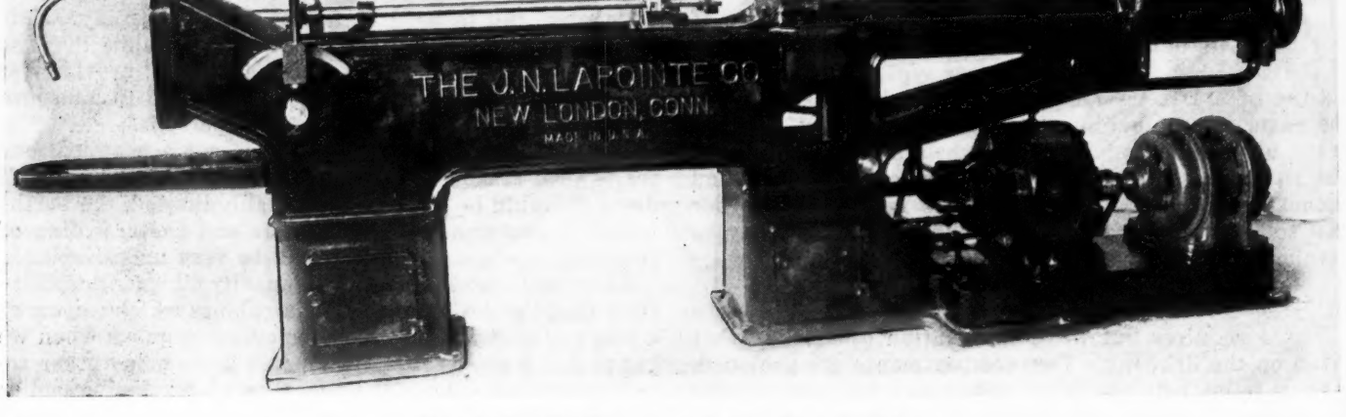
An unusually heavy bed has the vertical face plate with a 5-in. hole at the forward end and parallel cantilever extension at the rear. These support the cylinder, one end of which is bolted up at a heavy flange on the bed. The broaching draw head, which is mounted on the forward end of the piston rod, is carried on parallel ways at the top of the bed and has a vertical adjustment of 1⅝ in. above and below center for accommodation of the broach. The bed is supported by two box section pedestals, one under each end of the ways. The base of the rear pedestal extends to the rear, forming a common mounting surface for the direct coupled motor and pump just below the hydraulic cylinder.

A flexible coupling connects a 7½-hp. motor to the pump shaft, although belt drive may be substituted. The pump is driven at a constant speed of 600 r.p.m., pressure and volume of output being controlled through an eccentric adjustment by the usual hand control lever at the head of the machine. The limits of both pressure and volume are controlled for any particular class of work by a special locking device that removes regulation of feed and maximum pull from the judgment of the individual operator.

Adjustment of this locking device permits the establishment of any desired pull and regulates the feed at any speed in the range of 0-25 f.p.m. Regardless of cutting speed the return stroke of the ram may reach the maximum of 25 f.p.m. The maximum pull on the broach is 35,000 lb. when the motor is used. The oil line is also equipped with automatic valves which prevent the possibility of overloading. A bourdon gage, located just above the cylinder mounting flange in view of the operator, indicates any change of pressure resulting from dulled tools or other unusual conditions. These provisions have been designed to prolong the useful life of broaches, which are not inexpensive, to improve finish by removal of vibration, and finally, to reduce unit cost by faster operation. A broad range of feeds and speeds adapts the machine to economical production.

Cast Iron Hydraulic Cylinder Used

Close grained cast iron of liberal section is used for the hydraulic cylinder which is connected to the pump by short lengths of tubing with heavy welded flanges at the ends. The maker states that there is nothing of a new or experimental nature involved in the construction of the pump, but that it is of the same type which has long been used in naval service for the control of guns, turrets and steering gears. The construction is very simple and no auxiliary pump is required to take care of internal leakage.



New hydraulically operated broaching machine

It is said that the adoption of the hydraulic in place of the screw type ram results in a saving of about 60 per cent of the power required to drive the machine for a given broaching operation. At the same time the rate of production as compared to the screw type machine is increased by 100-300 per cent. While using a broach 48 in. long 250 pieces have been put through one of these machines in an hour.

Standard equipment includes the usual stop device and cutting lubricant system with an under pan projecting from the forward pedestal.

A rather complete equipment of reducing and pull bushings of standard sizes is also shipped with the machine. The weight, equipped for electric drive, is 3500 lb. and floor space required is 13½ ft. in length by 27 in. wide.

Automotive Business Figures in German Industrial Mergers

A REPORT on economic conditions in Germany up to last March has just been issued by the British Government which contains a number of facts calculated to interest American motor manufacturers.

It almost seems as if 1922 was a year of merger mania in Germany. Hugo Stinnes, of course, leads the way, and out of the 1388 undertakings that now comprise his group, an organization capable of controlling a complete range of motor products is possible. The machinery for an export trade in this group also exists, for it has ramifications in Austria, Hungary, and Jugo-Slavia, and controls a number of shipping lines that between them visit most of the ports of the world.

The Krupp group is also worthy of special notice. It has two organizations for the sale of motor vehicles and one for power farming machinery, while a trade concession has been concluded with the Soviet Government. Last year the number of trucks produced at Essen was 450 per cent more than the total for 1921, while power farming products increased during the same period by 275 per cent. The Stumm group devoted much attention to the output of trucks.

Automobile Buying Normal

It might be said that local automotive buying, so far as actual needs are concerned, is normal. The shortage of money is compensated for by the fact that there is always a fear, owing to continued depreciation, that what costs one mark today might cost two in a fortnight's time. Owing to the depreciation of the mark, too, motor vehicle taxation requires constant amendment. (An outline of revisions in this direction were given in AUTOMOTIVE INDUSTRIES of April 5th last.)

An instance showing the aversion to the paper mark is given by the General German Automobile Club, which stipulated that the subscription for the first half of 1923 should be 2 gold marks per member.

Despite the low value of the mark the German motor industry retains large advantages in labor, fuel, and transport costs, while its group syndication insures the industry a cheap raw material supply. Last January it was agreed that the wages of skilled workers engaged in motor car manufacture and repair should range between 896 marks to 669 marks per week. These sums are ridiculously small when the value of the mark in foreign markets is considered. Wages fluctuate almost weekly, but never get near cost of living prices. It says much for the German worker's patriotism that strikes in such circumstances are almost unknown. There is a greater output per man today than in 1913, although this is not compensated for in production owing to the introduction of the 46-hour week.

Foreign demands have kept the industry very busy, but credit conditions are difficult, making the financing of export business very acute. From January to October, 1913, 10,900 tons of motor vehicles and motorcycles were exported. During the same period of 1922 the figure was 16,300 tons, while 10,136 gas engines for vehicles and aeroplanes were also exported during these ten months.

Overseas prices, as might be imagined, have fluctuated to a remarkable extent. This has caused irritation to customers and placed endless obstacles in the way of agents. Complaints as to deliveries both in quality and punctuality are numerous and world-wide. The reasons for these protests are, first, the superfluity of orders which caused work to be scamped and sales to be effected to the highest bidder regardless of contractual obligations; second, the exercise of foreign trade control.

Domestic Fuel Output Pushed

Commercial treaties were arranged last year with Russia, Italy, Finland, Latvia, Czecho-Slovakia, and Chile. Those with Spain and Portugal lapsed, while negotiations are at present proceeding with Poland, Bolivia, Brazil, Liberia and Siam. The most important of these international agreements is that with Russia, and will no doubt result in the absorption of many German-made cars, lorries, tractors, motor boats, and aeroplanes. German motor manufacturers have established agents in several of the more important towns in this field.

A great attempt is being made to render the country self-supporting in motor fuel, although the loss of the Ruhr coalfields has made this effort more difficult. Lignite production is rapidly increasing as a result of coal difficulties, but its calorific qualities are limited. It does not pay to transport lignite any distance and, accordingly, motor fuel is being refined from it adjacent to the mines.

THE importance of obtaining information concerning the action of impurities in storage battery electrolytes arises from the detrimental effects which many of them produce on the operating characteristics and life of the storage battery. Such information is necessary as a basis for the preparation of specifications covering sulphuric acid for use in batteries.

A new method of measuring the rate of sulphation of storage battery plates was recently devised at the Bureau of Standards. The same method and apparatus have been employed in a recent investigation with some modifications, and the effects of small amounts of iron, manganese, platinum and copper have been determined.

It was found that the presence of 1 part in 10,000,000 of platinum in the electrolyte increases the local action at the negative plates 50 per cent; the effect of copper is much less, while the effect of iron is of unusual interest because of its accelerating action at the negative plates.

Manganese deposits upon the positive plates in the form of manganese dioxide which covers the active material, closes the pores, and causes a large amount of charging current to be wasted as gas. Work is being extended to include the effect of other impurities.

Dynamometer Rear Axle Tests Do Not Tell Whole Story

No great comparative value unless commercial efficiency is considered. Operation on road with payload important factor.

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial on Rear Axle Efficiency makes very timely comments on a paper which was read in Cleveland. Both you and the author of the paper point out that the figures should not be taken as conclusive evidence on relative efficiency and relative endurance.

Every engineer is aware of the fact that there is some difference in efficiency between ball and roller bearings of the same relative capacity; that there is a considerable difference in price, possibly a difference in length of life and adjustment needs, and that there is a difference in space requirements for the same capacity. In designing an axle for commercial use therefore, it is impossible to choose a ball or roller bearing because one is more efficient than the other, without reference to cost, life of the bearing, accessibility for adjusting, and compactness of design. Starting from these simple bearing elements, the complications involved in design multiply very rapidly.

Any test results on complete axles are of no great comparative value unless they cover efficiency in transmitting power, relative capacity, relative price, and a number of other factors such as road clearance and overall dimensions of various kinds, all of which enter into commercial efficiency as distinguished from mechanical efficiency.

Any test results based on the mechanical efficiency of an axle as obtained on a dynamometer stand may be extremely misleading because the axle is only tested from the viewpoint of torque or horse power transmitted. The axle on the test stand is not subjected to the same forces as when it is placed under a truck. It is possible to design an axle with a very high efficiency on a test stand which would be extremely inefficient on the road, and it is certain that many commercial axles which show good efficiency on the test stand will not show similar efficiency on the road when carrying a fair payload, due to the distortion of the various members under load.

Effect of Bending of Load Carrying Member

A well-built worm drive axle would probably show practically the same efficiency on a test stand as it would show on the road if the worm gears are carried in a single casting, which is not affected by the bending of the load carrying member. Other types of axles, in which the gears are carried in the wheels or in which the gears are rigidly fastened to a semi-floating axle shaft (as is the case in one axle Von Ammon tested), naturally would show a decrease in efficiency on the road because of misalignment of gears and shafts.

While it is a generally accepted fact that the worm drive is not the most efficient form of axle from the mechanical efficiency standpoint, it is a generally accepted fact that it has a good record for commercial efficiency; the mechanical transmission losses in some cases being of less moment than simplicity, ease of repair, and freedom from noise. Some of the figures showing worm drive axles losing as high as 40 per cent in mechanical efficiency are obviously incorrect because that amount of power lost through friction in an axle must appear somewhere principally as heat, if the law of conservation of energy is kept in mind.

Effect of Various Factors on Efficiency

In analyzing axle test figures, it is not difficult to allocate approximately the losses in various elements such as bearings, gears, dragging brakes, oil churning, and so on. In face of such impossible statements as "driving near the wheel increases the power," and "the friction in the differential increases power" all engineers and most laymen know that every bearing and every pair of gears introduced in a power transmission system reduce the amount of power delivered in the form of useful work. Therefore, the type and quality of gearing and bearings used will affect the overall efficiency quite directly and doubling or tripling the number of gears and bearings must reduce mechanical efficiency.

A straight tooth bevel gear axle is probably the most efficient type, but of course, it can only be used on relatively light duty vehicles where high ratios are satisfactory. On such vehicles it is also possible to obtain a rear axle efficiency of 97 per cent with a worm gear set because there is a quite definite load and speed requirement which varies to an exceedingly small degree during the average performance of the vehicle.

The worm gear does not show to good advantage in heavy duty truck performance, as Von Ammon pointed out, because of the wide range of speeds and load and the space limitations restricting the size of worm gear. It is regrettable that Von Ammon did not test a spur and bevel gear double reduction axle of the type to which the British Government gave approval in its subsidy war trucks. The subsidy axle designs were adopted by the British Government after thorough tests on all types of axles, whereas the original Class B axle design was adopted because the worm drive axle manufacturing plants seemed to offer the most immediately available large production possibilities.

Apparently Von Ammon pointed out one of the common fallacies in connection with the chain drive, namely road clearance. It is true that no common form of drive has greater road clearance under the axle bed than the chain drive, but inasmuch as the rear wheel sprockets are usually only a few inches from the ground, the road clearance in muddy going is less than almost any other type of drive because the chains and sprockets will not operate long when immersed in a mixture of mud, water, and gravel, and the same weakness precludes much work in sandy roads.

Ninety-five per cent of the trucks produced in this country are standardized so the difference between engines is one of detail rather than fundamental principles. Transmissions also are similar in principle in all heavy duty trucks. The rear axle is the highest priced unit and really the only large unit which has gone through radical changes in principle in the period from 1910 to date.

The sudden change from chain drive to worm drive, the rapid climb and gradually falling off in internal gear production, the slow but steady growth of the double reduction, and the introduction of many new drives, some commendable and some freakish, show that the rear axle is still the most complicated problem for the truck manufacturer.

The new and widely different applications of delivery, freight haulage, and bus transportation make it certain that no single type of axle will ever meet the universal acceptance which the standard type of truck engine has attained up to date.

W. F. ROCKWELL,
General Manager,
Wisconsin Parts Company.

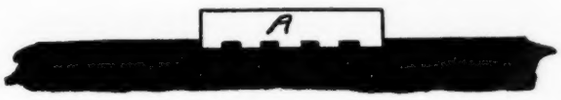
Adhesion and Traction Confused

Editor, AUTOMOTIVE INDUSTRIES:

In the discussion centered about large cross-sectional tires, the only point advanced is that the increased tire contact is responsible for the greater traction at the wheel. All other phenomena entering into this are disregarded.

In reference to A. L. Putnam's letter, he mentions the use of caterpillar bands on tractors for increased traction comparing this directly with the large cross-sectional tires now coming into vogue.

In my estimation, the bands do not give increased traction directly because of the larger area in contact at the ground, but because the band increases the rolling resistance or, as it is sometimes called, rolling friction. In Fig. 1 we have the case of a traction band when passing over soft earth.



Let (A) represent one shoe of the band. Owing to the corrugations or grooves in this shoe, we have little mounds of earth formed between them. Before the band can slip it has to shear these mounds and by increasing the width of the band, we have a larger area of these mounds to shear which results in increased traction. However, we can get the same result by decreasing the width of the band and increasing the number and width of the grooves in the shoes. Therefore the increased traction is not directly a result of increased area in contact. Tractor wheels with angles bolted on or having chains laid across the rim will in most cases give the same traction as the caterpillar band. However, this leads us to another point.

Every material substance has a safe unit bearing stress. Assume this to be 28 lb. per sq. in. for earth. With a tractor weighing 5000 lb. and the area in contact at the wheels equal to 100 sq. in., we have a net pressure of 50 lb. per sq. in. bearing stress. Replace the wheels with a band having an area in contact of 500 sq. in. Bearing stress equals 10 lb. per sq. in. In the former case the tractor will sink, while in the latter it will ride on the surface of the field. This, I believe, was the chief reason for adopting tractor bands, especially in heavy duty jobs where soft earth has to be negotiated.

Now taking the case of the large cross-sectional tires compared with the narrow tires, there can be no advantage when used on hard city pavements relative to increased traction. The amount of rolling friction would be practically the same in each case. Since the kinetic friction is independent of the area in contact, both tires would give the same traction result. On muddy earth, we would have the same comparison as the tractor band and the wheel. The large tire would have increased traction and also would not permit the car to sink into the earth.

There seems to be a confusion existing between the terms adhesion and traction. Adhesion is the attraction between unlike surfaces and varies directly as the area in contact. Traction depends upon the friction at the wheel and is independent of the area in contact (i.e., considering an unyielding surface below the tire, which is always done when a frictional formula is derived). It is not the adhesion that causes a car to move, but it is the friction between the tire and the earth. If we could make the area in contact frictionless, adhesion would still remain, but would the car move?

On a hard pavement, either wet or dry, I can see no reason why a 7 in. tire should handle better than a 5 in. On muddy roads, the 7 in. should negotiate considerably easier, safer and more effectively than the 5 in.

ALEXANDER I. NEWMAN, Student,
Armour Institute of Technology.

Troubles with Large Section Tires

Editor, AUTOMOTIVE INDUSTRIES:

Our attitude in regard to the so-called balloon tire is expressed in an article entitled: "Do We Believe in Large Tires for Small Cars?" which appears in our house organ. Following are quotations from this article:

"Successful as the large tire may prove on the rear wheels of a passenger car, several car manufacturers have found it unsuitable for front wheel work.

"We all know that a flat or unduly soft front tire is more apparent to the driver by the difficulty of steering than by the feeling of the rim on the road. The easiest steering is secured when the front wheels theoretically represent only a point of contact with the road.

"We have no figures indicating the gasoline mileage to be obtained from tires of this type in the case of the ordinary car owner. However, it would seem reasonable to suppose that, inasmuch as a smooth road and hard tires offer the least rolling resistance because of the reduced area of contact, large tires with their very low inflation pressures and consequent large area of contact would prove exceedingly inefficient on fuel mileage. A flat or soft tire is always a gasoline eater and if we multiply this by the four wheels in the case of the exceedingly soft or flat large cross-section tires, we might see our fuel bills increase from twenty to fifty per cent."

HAROLD W. SLAUSON,
Engineering Service Manager,
Kelly-Springfield Tire Co.

What Causes Increased Traction?

Editor, AUTOMOTIVE INDUSTRIES:

Regarding A. L. Putnam's letter in AUTOMOTIVE INDUSTRIES of May 17, the points at issue are simply whether the larger section pneumatic tires have increased traction and braking action and offer freedom from skidding, and if so, what are the technical reasons for these qualities.

S. P. Thatcher states in effect that these advantages

are due to the non-skid tread (AUTOMOTIVE INDUSTRIES, May 3), and Mr. Putnam claims they are due to the larger area in contact with the road surface.

I agree with Mr. Thatcher that the non-skid tread may account for some of those qualities, but I entirely disagree with Mr. Putnam for the reasons given in my letter, published in your issue of May 3.

In proof of his contention that the greater area increases the traction, Mr. Putnam cites the caterpillar tractor and the locomotive where the front wheels of a freight locomotive have been changed into drivers to give better traction. He overlooks the one essential feature in the cases cited, to wit, that the load on the drivers or on the driving area is considerably increased. In other words, the greater the load on the driving surface area, the better is the traction. In a caterpillar tractor or in a four-wheel drive truck the entire load is supported on the "drivers." This, however, has no relation to the question at issue, "why a larger pneumatic tire has better traction and better anti-skid qualities than the ordinary pneumatic?"

Mr. Putnam further claims the pneumatic tire on a truck has better traction than a solid tire by virtue of the larger area on the ground, the total pressure on the wheels remaining the same. I disagree with this statement most emphatically. In my opinion the increased traction of the pneumatic over the solid tire is due to various other causes. One of these is that the pneumatic tire will "absorb" small obstructions on the road without raising the wheel (and to some extent the entire chassis) hence, the tire will continually be in contact with the road surface, while the solid tire, in going over the same obstruction, will not "absorb" them. The wheel and axle will be raised and there is, to some extent, a certain slippage of the wheel after it leaves the obstruction; this is accentuated by the fact that when the chassis is thrust upward (due to its passing over the obstruction) there is for a certain time interval a smaller pressure or load on the driving wheels and this will also tend to cause a certain amount of spinning of the wheel. The faster the speed of travel, the greater is the wheel slippage.

Furthermore, the anti-skid treads of pneumatics on trucks will assist the traction; any anti-skid tread reduces the actual area of tire surface on the road and hence increases the pressure per square inch of rubber on the road surface.

Discussing sidesway, Mr. Putnam says "the springs are the liveliest things in the car and with small tires get nearly all of it; with the large tire the springs simply get less and the tire more, total the same."

One might as well say that if a weight, of say, 10 lb., is suspended by a rope 5 ft. long and a 2-lb. force is applied at the side of it, it will deflect (from the perpendicular) the same amount as when a certain length of chain is added to the rope, thereby increasing the total length to say 10 ft., everything else remaining the same. This is, of course, not true.

To conclude, if the larger section tires really do what is claimed for them, I believe I could find a better argument as to the cause for the increased traction.

ETHELBERT FAVARY.

Wide Field Covered by Latest Automotive Books

A TEXT book for the man who desires to educate himself in the subject of electrical maintenance has recently been written by Paul McDowell Stone under the title of "Electricity and Its Application to Automotive Vehicles."

The first nine chapters are devoted to the fundamentals of electricity. Following this, the subject of ignition is covered. There is a chapter on battery ignition which covers the general features of this class of equipment and also gives specific information on the various systems produced by different manufacturers. Magnetos are handled in a similar manner in a succeeding chapter. Firing orders, ignition timing and spark plugs are then discussed.

The next portion of the book is devoted to generators, relays, regulation, drives, starting motors, protective and controlling devices, lighting and signalling devices. Following this there is a section devoted to detailed information on the different makes of starting and lighting equipment.

D. Van Nostrand Co., New York, is the publisher.

THE automobile industry, until very recently, has centered the major part of its attention on engineering and production which is the reason, perhaps, why more books have not been written about automotive merchandising.

Selling motor vehicles is a specialized field in which there is a vast amount of controversy. Some more controversy may be opened up by Cliff Noble's "Automobile Selling Sense," which has been published recently by Prentice-Hall, Inc.

Noble, in his book, directed to dealers, salesmen and distributors, embraces the entire range of selling from advertising to keeping the customer satisfied with his purchase. He gives good, sound advice which, if followed, would smooth the path of many an automotive retailer. The author does take too much for granted, however, that the manufacturer is always right and that the dealer need only follow the factory to come out on top.

Among other things Noble states that "90 per cent of all automobile advertising is good advertising" and again that "advertising is an investment which pays in proportion to the amount used." Standing by themselves these statements are misleading. They should be qualified.

All things considered, the manufacturer would do well to recommend this book to his retailers. The latter may use it as a working basis and will obtain much material which they can put to immediate use. Sound judgment will tell the retailer where the manufacturer has been over-rated and he can steer his course accordingly.

MOTORISTS who are beginning to feel the urge to get out into the open may find guidance in "Motor Camping," by J. C. Long and John D. Long, recently published by Dodd, Mead & Co.

The volume shows how to deal with the various problems that arise in camping with a car. Numerous cooking recipes are given and tent and sleeping equipment described in detail.

There is a special chapter for week-end campers and a section presenting different devices for Ford owners. Over 2000 camping sites classified by States are listed and information is given concerning State laws governing motor vehicles, trailers, hunting and fishing.

Motor Vehicles Raising Suburban Land Values

GOOD roads advocates always have maintained that improved highways inevitably enhance real estate values. The tax assessor has sustained this view and it has been one of the strongest arguments for highway expenditures.

Evidence accumulates that this contention has been well founded and that the enhancement of real estate values will increase rather than decline. The motor vehicle is likely to change entirely the complexion of American urban life and city planning.

The latest convert to this point of view is Roger Babson. There are those who profess not to regard Babson very highly as an economist and statistician, but even they admit that he is a mighty shrewd observer and that his forecasts of general trends are right more often than they are wrong. Babson regards the effect of the automobile upon city life and real estate values as of sufficient importance to warrant a special letter to his clients in which he says:

"The automobile is bound to affect seriously the business of bankers and merchants who cater to the well-to-do trade. Before the advent of the automobile these people could come into the city as conveniently as they could go anywhere else to bank and to shop. They used the suburban trains, as other people did, and in many cases lived directly in the city within walking distance of the shopping center. The automobile has completely changed these conditions. Most well-to-do families, and at least their children, have moved from the city into the suburbs. What formerly were the best city homes are becoming boarding houses or are being torn down so that the property may be used for business purposes. Few beautiful homes for the wealthy are being built in the cities. People who can afford it have moved or are moving into the suburbs. Many of our cities, unless they extend their city limits, will have a smaller population ten years from today than they have today. This will greatly affect real estate values. Real estate in these cities may decline, while real estate in the suburbs will double and treble in price.

"Bankers, bond dealers and merchants catering to the more exclusive trade will be most adversely affected. Not only have their customers already moved from the city, but they have given up the use of the suburban trains and now depend wholly upon automobiles. When there were comparatively few automobiles this made no difference. These people still drove in to their bond dealers, bankers, safe deposit boxes, tailors, jewelers and specialty shops, leaving their automobiles outside the door while they transacted their business. Today, however, with the great congestion of automobiles, this is practically impossible in most cities. Delays at cross streets, the various regulations regarding one-way streets, lack of parking facilities, etc., take away the joy of using an automobile for city shopping.

"This means that these banks, bond houses and stock exchange firms and retail shops will eventually lose the exclusive trade upon which they have so much depended, unless they open offices in the suburbs. Wealthy people will not revert to the suburban trains, nor be content to play hide and seek with a chauffeur around the block. Stores will continue to have the trade of people who cannot afford to have cars, including the trade of clerks and of transients; but the exclusive trade they will lose. Rents on many of our most exclusive city streets will be less ten years from today than they are today. The automobile will greatly increase suburban values but will depress city values, especially on streets where automobiles cannot stop. Considering the fact that such locations are now often the most expensive and desirable, the effect of such a revolutionary development may be very startling.

"This means that clients who cater to the exclusive trade should immediately look up good locations for branches in the more exclusive suburbs. It may be well, for the time being, to keep the main store in the city, even though it is on a congested street, but one or more branches in the better suburbs should be opened immediately.

"Retired people will not much longer go to the congested centers to order securities, then go again and take up these securities, and carry them to their safe deposit boxes. They will insist on doing business in one of the suburbs where they can park their cars and take their time. They will have their safe deposit boxes in these suburban districts, and also do a good part of their shopping there."

Success of Future Policy Depends on Knowledge of Markets

Lack of information one cause of rise in cost of distribution. Analysis will furnish ground-work for more effective and accurate decisions. Need for speculative judgment will never be completely eliminated. Absence of preparedness evident.

By Harry Tipper

SOME years ago Hobson, the English economist, remarked upon the increasing importance of speculation upon the future, which enters into all transactions of business. He pointed out that future possibilities and requirements become more and more important as industry grows and that correct judgment upon the future possibilities and tendencies has a constantly greater influence upon the position of the individual concern.

This judgment must become keener as the industry grows and as its relations with other industries become more complicated. Especially is this true today, with the cost of marketing increasing and the future of the market somewhat obscure beyond the immediate future. The problem of future buying is at the root of wise expenditure in plant, extension of service and buying of needed material. Estimates of what the market will be in a few months or a year affect the entire layout of the manufacturing operations, while the corresponding speculations of the market of five years away govern today's viewpoint on investments in plant and equipment.

All through the organization the position of the concern as to the extent of the capital involved, the future size of plant and equipment, the method of purchase and the development of distribution are based upon some estimates of future business possibilities, however hazy these may be and however much of guesswork may be involved in the judgment. Every daily decision of the executives on marketing matters is affected by these same future estimates, which are speculative to a greater or lesser extent in all cases.

In such matters we are apt to excuse the large percentage of guesswork by the statement that the factors are all so variable as to preclude any scientific method of approach to their solution. We speak about the exact factors of mechanical sciences and the possibility of applying calculations with exactitude to new situations, and then explain that this is impossible in marketing, so that there is nothing to do but guess as to the future, hoping that experience has given us enough intuition as to its tendency to enable us to get by with our estimates without suffering unduly for our guess.

We fail to consider the very large area of hypothesis upon which all scientific considerations rest and the difficulties which confront the chemist and engineer when new problems are to be faced. Despite all the previous work which had been done on bridges the erection of the Quebec bridge was a sufficiently speculative matter to require three attempts before the construction could be successfully completed.

THE problems of today and tomorrow demand a keener consideration of the market than the problems of yesterday. Every year added to the history of the business increases the difficulty of proper decision.

The job of market analysis or study is not to provide formula by which the slide rule can give the answer to a future problem. Any attempt to make this kind of a rule out of such study will nullify the whole value of the result.

Knowledge Tempers Judgment

All engineers and chemists know that they are constantly exploring, speculating, guessing upon the future and upon the problems which are before them. They know how inexact are their calculations and how much they must study a problem in order to find an answer which will have reasonable opportunity to be practically successful.

It is obvious from an examination of the whole situation that the executive in business cannot hope to remove the necessary speculation about the future. No extent of marketing analysis and research will give him a rule or a formula which can be used without important modifications or without many reinvestigations.

The purpose of marketing analysis is to supply such information as exists, to add further information by proper methods of research, and to suggest probabilities, tendencies and future developments therefrom, so that the speculative judgment of the executive will be based upon a broader area of understanding and a larger amount of information than he can gather in his own experience. It will serve to correct his own impressions so that the prejudices of his own experience are eliminated by a consideration of the information, and it will check his impressions so that he will be able to establish policies of a firm character, but flexible enough to meet the requirements of future modification.

So long as the opinion of future markets and conditions rests almost entirely upon experience and guesswork, any opinion is as good as any other and consequently there is great confusion in the councils and difficulty of agreement in the executive camps of the various concerns.

Men who could at least agree upon the basis of discussion on an engineering problem are hopelessly divided

when it comes to a question of future markets or the methods most suitable for cultivating and maintaining them.

If you get close to the various executives of a manufacturing concern, or sit with them when these matters are discussed, it is not difficult to discern the fundamental differences in the outlook and the fact that any man has just as much authority on that question as any other man regardless of his study or his thought on the subject.

This, of course, is one of the reasons for the increasing cost of distribution and its tendency to continually increase. It is one of the reasons for the confusion and difficulty in which hundreds of concerns find themselves as to their future operations, and which operates to suggest so many false moves in methods which must be thrown out after a while and paid for by the loss of standing in the market.

The problem in the automotive field has been of such a simple character up to the present that the difficulties imposed by this lack of marketing understanding are not fully realized. Production, more production and plenty of outlets have been the problems, whereas these are no longer sufficient to answer the question for many of the companies doing business in the automotive field today.

There is little or no evidence of a future policy on the part of these companies. They are struggling to meet the situation as it arises and they are about as ready as the Allies were in the beginning of the war. The problems cannot be met without preparation and this preparation must be made before the problem becomes acute and not when something must be done immediately to save the ship.

Longer Vision of Markets Needed

These things should be borne in mind. Market information is of the utmost importance to the proper judgment of problems which must be decided in one way or another.

Market judgment requires constantly a longer vision of the market in order to judge capital requirements, the questions of extensions, methods of development and future requirements. These questions must be settled. They will not be dealt with in an orderly way unless the knowledge of the market is pretty complete and effective.

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Market judgment requires constantly a longer vision of the market in order to judge capital requirements, the question of extensions, methods of development and future requirements. These questions must be settled. They will not be dealt with in an orderly way unless the knowledge of the market is pretty complete and effective.

Dependence upon experience and guesswork in judging these problems promotes confusion in discussion, disagreement in operation and the frequent change of decision because the objective is not clear and comprehensive.

The problems of today and tomorrow demand a keener consideration of the market than the problems of yesterday. Every year added to the history of the business increases the difficulty of proper decision.

The job of marketing analysis or study is not to provide formula by which the slide rule can give the answer to a future problem. Any attempts to make this kind of a rule out of such study will nullify the whole value of the result.

The study must be understood by the executive in order to make it effective for him in his judgments. It will not do to have this sort of study made by some one detailed to do it and then simply accept the information or conclusions without critical examination and understanding. Only when the study is thoroughly understood can its factors be used with that flexibility demanded by the character of the work and the individual variation of the problem.

In no case will information on the market remove the necessity for speculative judgment on the part of the executive. The information will permit the judgment to be exercised more effectively and more freely because the ground work of knowledge will be enlarged and consequently the actual perspective will be improved.

Systematic Safety Campaigns Bring Reduction in Accidents

A CAREFUL study of the experience of St. Louis, Milwaukee and Washington and some dozen other cities in which community safety has been successfully organized reveals the significant fact that there are three determining factors which are largely responsible for the success in reaching all of the people and inducing them to stop being careless and to begin to be careful. These three factors are:

Systematic daily safety instruction in the public and parochial schools.

A continuous poster campaign on the streets.

An intensive educational campaign in the daily press.

The above statement was made by C. W. Price of the Elliott Service Co., New York, before a meeting of the Board of Trade of Louisville, Kentucky. The experiences of the three cities mentioned he gave in part as follows:

Comparing the records of St. Louis in 1917 with the records of 1922, deaths from street car accidents were reduced 56 per cent; deaths from steam railway accidents were reduced 60 per cent; industrial deaths were reduced 86 per cent, and deaths from automobile accidents were reduced from 32 to 13 per 10,000 machines, or the records of the reduction in automobile accidents is especially significant when we consider that during the last five years the number of automobiles in St. Louis increased from 24,000 to 92,000.

In 1920 the Milwaukee Association of Commerce organized a safety council and during the next two years as a result of their efforts accidental deaths from all causes were reduced 24 per cent, and deaths from automobile accidents were reduced more than 50 per cent.

Following a successful safety week in November, 1922, the Washington Safety Council was organized and began to function Feb. 1, 1923. During February and March accidental deaths from all causes were reduced 32 per cent as compared with the record for 1922, traffic deaths were reduced 43 per cent, and deaths to children were reduced 85 per cent.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE
Reg. U. S. Pat. Off.

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One Way to Breed Radicals

BASING its argument upon the registration of 460,528 automobiles in Iowa, as reported by AUTOMOTIVE INDUSTRIES in its statistical number, the Buffalo *Enquirer* publishes an editorial rather bewailing the fact that one out of every five persons in that exclusively agricultural state owns a motor car.

One C. S. Walker, president of the Iowa Manufacturers' Association, is quoted as having said that "it's the automobile that nearly ruined the farmer," because "they pack up in the fall when there's a lull in the farm work and start out." We can feel Mr. Walker shudder when he says he has seen Iowa license plates in New York, Boston and Toronto.

It certainly is an outrage that an Iowa farmer should load his family into his car and drive to Boston or New York after his season's work is done.

No wonder farmers get rabid and form "blocs" when they read such drivel. Pompous, platitudinous persons, such as Mr. Walker appears to be, with viewpoints as broad as a razor edge, with no sympathy for the desire of the man who works to get a little joy out of life, are much better promoters of radicalism than Soviet envoys.

Perhaps the writer of the editorial has forgotten that the owner of the *Enquirer* got his start in life as a 'longshoreman.

Reliable Statistics

MUCH has been accomplished by Secretary Hoover of the Department of Commerce in the compilation of production statistics. This reliable information undoubtedly is of distinct value to industry for it affords an accurate basis of comparison.

Hoover has not gone as far as he would like, however, in gathering statistics and no one realizes more fully than he the importance of what remains to be done. He had hoped to be able to accumulate equally reliable data in reference to consumption in all lines and he has not despaired of being able to do so.

If Hoover makes it possible to chart, simultaneously, accurate comparative curves of production and consumption, he will have made a tremendously important contribution to the stabilization of industry. So long as the curves remained virtually identical, it would be evident that business was gaging its speed correctly. If the consumption curve moved upward more rapidly than the one showing output it would demonstrate that the time had come to speed up. If the reverse were true, slowing up would be necessary to avoid over-production and its attendant evils.

Preventing Over-Production

PRODUCTION statistics of various kinds are not uncommon, but the Hardwood Manufacturers Institute has gone a step further than most organizations of its kind in the statistical program it has undertaken. It will include in its reports figures showing stocks on hand and unfilled orders; past sales and production. The value of this data to the building industry, motor vehicle manufacturers and others is readily apparent. When it is possible to compare the reports for several months, an important stabilizing effect may be exerted.

The stock report which will be compiled monthly will show the thickness, grade and kind of each wood on hand as of the first of the current month, both dry and green, total amount of unfilled orders, amount oversold and amount unsold. Each report will compare the amount unsold with the amount unsold on the first of the preceding month.

The May report was the first compiled and it gives the following illuminating information:

	May 1 Total Stocks	May 1 Unfilled Orders	May 1 Oversold	May 1 Unsold
Southern Territory.	264,800*	83,476	20,397	201,721
Eastern Territory..	120,257	32,610	3,511	91,158

*Figures denote thousands of feet.

Similar reports for the automotive industry would do much to prevent costly over-production.

Motor Vehicle Fatalities Can Be Eliminated by Scientific Traffic Regulation

MOTOR vehicle accidents can be minimized and fatalities eliminated by rigid regulation of traffic.

This elementary fact, which seems to be little understood, especially by legislators, has been demonstrated in New York City and it is proved by statistics gathered by the Department of Police.

Passenger automobile traffic is denser in Fifth Avenue than in any street in the world, but—

In the year 1922 there was not a single fatal accident between Washington Square and Fifty-ninth Street, where the long lines of motor vehicles of every type, from big buses down to tiny roadsters, are regulated by policemen stationed in traffic towers in cooperation with bluecoats of the traffic squad on foot with their code of whistles.

This shows what can be done if sufficient attention is given the work of prevention. It appears to prove also the value of the tower system, for there were two fatal accidents on the Avenue between 59th and 116th Streets where the towers are lacking.

Additional evidence of the value of the Fifth Avenue system is given by the accident report for Broadway, which shows four fatalities for the year between Eighth Street, which corresponds roughly with Washington Square on the Avenue, and 59th Street.

A modification of the tower traffic control system is in operation in the "Roaring Forties" on Broadway, where traffic is terrifically heavy during the night theater hours. There was only one fatality for the year in this stretch and that was at Times Square, where congestion is worst. The statistics are interesting:

Street	Passenger Cars		Commercial Cars	
	Accidents	Fatalities	Accidents	Fatalities
Fifth Avenue (Wash. Sq. to 125th)	450	2	74	0
Broadway (Rector to 72d)	422	5	126	1
Fifth Avenue (8th to 59th)	231	0	55	0
Broadway (8th to 59th)	285	4	63	0

It is significant that the number of accidents in that section of the Avenue where traffic is densest, but where it is controlled by the traffic towers, was only a little larger than in the other section where traffic is much lighter. Another fact to be considered is that there is no bus line on Broadway, but there is a surface car line. There also are many more horse-drawn vehicles on Broadway than the Avenue.

These figures constitute the most severe indictment yet drawn of failure to regulate traffic rigidly. They demonstrate that where there is real regulation on scientific lines deaths can be prevented and accidents materially reduced. It undoubtedly is true that a big majority of the Fifth Avenue accidents were the fault of the victims themselves who tried to save a few seconds by dashing across the street through moving traffic in defiance of police orders.

When cities provide enough patrolmen to regulate traffic properly they will cut the accident hazard very sharply. Safety campaigns, if they reach the habitual "jaywalker," will help, but nothing can take the place of actual police control. At least 95 out of every 100 motor vehicle drivers obey the traffic officer's signals to the letter. If they didn't they would be fined or jailed. The same is not true of the pedestrian who defies traffic rules.

Rigid regulation along sound and sane lines will do vastly more to reduce accidents than any amount of legislation aimed at motorists. Drastic licensing requirements and speed limits which would throttle the gasoline engine down to the speed of a more or less animated horse will not cure the accident evil. It is the reckless rather than the inexperienced driver who is the menace and the place for the reckless driver is a comfortless cell in a cold jail. No amount of examination and testing will disclose the moral hazard he involves.

Motorists owe an obligation to society to exercise all reasonable caution, but they should not be called upon to police themselves, and traffic regulation, either in a city street or on a country road, is a policeman's job.

Firestone and Miller Announce Price Cut

Former Makes Reduction of 10 Per Cent, Latter from 7 to 10 on Car Sizes

AKRON, OHIO, June 13—Action on the part of the Firestone Tire & Rubber Co. in announcing a blanket cut of 10 per cent on all casings and tubes, effective June 11, has surprised the industry and it is predicted that this action will be followed by reductions by other manufacturers. So far, however, there has been only one to follow suit, Miller announcing yesterday a decrease of from 7 to 10 per cent on all passengar car sizes.

Some Sizes Not Affected

The Firestone cut is a straight 10 per cent reduction on all solid and pneumatic tires and tubes with the following exceptions: Firestone fabric, extra size cord and 999 in the 3½-in. sizes, are reduced from 5 to 10 per cent; the entire line of Maxi cushion tires are reduced from 5 to 10 per cent, while the entire Oldfield line has been reduced a straight 10 per cent.

The Firestone action was unexpected because of the fact that Firestone followed the others in advancing his prices in March, although it was one of the last big companies to take this step. At that time the general advance was 10 per cent, making the second of the year, prices having advanced about 12½ per cent in January. As matters stand now, Firestone is just about back to his January prices.

In making his announcement of the reduction, Firestone states that "the crude rubber monopoly weakened when it came into contact with aroused public sentiment. The press of the country today reflects the determination of the American motorist that tire prices shall stay at a reasonable level—and that America must produce its own rubber."

Crude Rubber Lower

In a statement Firestone says that the lower cost of crude rubber and further economies in manufacturing have enabled him to make the present reduction. Commenting on the rubber situation and reviewing the fight he has made to develop rubber growing elsewhere than under the British flag, Firestone says:

These various phases of the situation were reflected in the crude rubber market, the price now being around 28 cents a pound, while immediately following the announcement of the restriction legislation last October the price of plantation rubber advanced from 14 to 37 cents a pound.

The increase last fall to 37 cents a pound was not based upon the natural economic laws of supply and demand but upon manipulation and speculation in the market, where a shortage was anticipated. The rubber growers, who had also secured control of the administration of the legislation through the British Colonial Office, became alarmed at the growing public sentiment aroused by Firestone activities and the result was that much more rubber was forthcoming from the British restricted possessions than the most

(*Continued on page* 1307)

Business in Brief

NEW YORK, June 14—No essential changes have taken place in business activity since the previous week. Retail and jobbing trade have shown improvement due to favorable weather conditions which caused increased demand for seasonal goods. Such price increases as occurred were more than offset by other reductions and the main price trend is still downward.

The outstanding development in production in May took place in three major lines—pig iron, automobile and crude petroleum—where records were broken. The daily average of pig iron production for the month of May has never been equalled. In view of this large output prices declined in practically all markets, while steel prices remained unchanged.

Railroad operating income for the month of April on Class 1 roads totaled $83,197,800, representing a return, on an annual basis, of 6½ per cent on I. C. C. valuation. This is the highest monthly return since the passage of the Transportation Act of 1920.

For the first time this year car loadings passed the million mark, with a total loading of 1,014,029 cars for the week ending May 26, an increase of 22,232 cars over the week previous. This record loading has been surpassed only twice in the country's history.

The slump in building activities which started in New York in April has spread to other cities and opposition to exorbitant construction costs is shown in a general decline of operations.

Dullness characterized the stock market for the week. Trading was largely professional. The bond market was quiet, railroad issues being most in demand.

"INDIAN" WINS GRAND PRIZE

SPRINGFELD, MASS., June 13—The Hendee Manufacturing Co. has received a cable announcing that the Indian motorcycle, which it manufactures, has been awarded the Grand Prize by the Superior Jury of Awards at the Brazilian Centennial International Exposition.

Columbia Considers Taking Over Liberty

Corporation to Be Formed Would Manufacture Both Cars in Liberty Plant

DETROIT, June 13—Negotiations are under way for the uniting of the Liberty Motor Car Co. and the Columbia Motors Co. under the name Columbia Motors Corp., the company to manufacture both lines of cars at the Liberty plant.

If present plans are consummated, J. G. Bayerline, president of Columbia, will be president of the company, with A. R. Demory, former president of the Timken-Detroit Axle Co., chairman of the board, and C. R. Talbot, vice-president of the National Bank of Commerce, Detroit, a member of the board of directors.

The negotiations are being worked out by the creditors' committee of Liberty with officers of the Columbia company and financial interests headed by the National Bank of Commerce. It is expected that details will be completed within a month, thus giving opportunity to bid in the Liberty plant by July 17, the new date of sale fixed.

The formation of the company will mean a considerable strengthening in the specialized unit car field. Columbia, already one of the leaders in this branch of the industry, will be given the advantage of the modern Liberty plant, declared to be one of the best assembly units in the industry. The present quarters of Columbia, which are leased, would be given up on the expiration of the lease and activities centered at Liberty.

Liberty Assets $1,600,000

DETROIT, June 12—The sale of the Liberty Motor Car Co. has been postponed by the receiver until July 17 at the request of the creditors' committee.

The receiver reports the assets of the company as approximately $1,600,000 on the basis of a going concern, divided about even between real estate and equipment for the manufacture of the Liberty car. The time of the sale is at noon, Eastern time. No upset price has been fixed.

Ford Will Build Cotton Mixing Plant at Memphis

MEMPHIS, June 11—Plans have been made for expansion of the Ford Motor Co.'s interests in this city, although no official announcement has been made.

These plans include the erection of a cotton mixing plant which will use 100,000 bales of cotton annually for making automobile cushions; the erection of a spoke factory and the purchase of wharf space for direct shipment of automobiles to Cuba.

Briggs and Michigan Stamping May Merge

Each Company Probably Would Continue Business Under Its Present Name

DETROIT, June 13—Consolidation of the Briggs Manufacturing Co., manufacturer of bodies, and the Michigan Stamping Co., one of the largest metal-stamping concerns in the industry, is being worked out, and details are expected to be completed within the next week or ten days.

By the proposed arrangements, Briggs will acquire the common stock of the stamping company, paying in part with Briggs stock. Both companies probably will continue under their present titles. No financing is involved.

The acquisition of the stamping company by Briggs will give the latter its own supply of metal stampings for body work, although the company will have capacity for other business and will continue present accounts. The stamping company has been supplying a large part of the Briggs requirements in the past. The active management of the company will be continued as at present.

Briggs at the present time is devoting practically all of its facilities to Ford and Hudson-Essex work. It makes the Ford coupé bodies in quantities close to 1000 daily and about 200 daily of the Hudson and Essex coaches.

Ford Moves Spanish Plant from Cadiz to Barcelona

DETROIT, June 13—The Ford Motor Co.'s plant in Spain has been moved from Cadiz to Barcelona because of the greater adaptability of the latter point for distribution and also because of better labor conditions.

The output of the new plant will approximate that of the former and will permit of increased production and expansion as demand for cars increases. While it is proposed to move the French plant from Bordeaux to Rouen, the company is not prepared to make any statement at this time because plans have not been completed.

Production of Ford cars and trucks in the week ending June 12 was 40,346, an increase of 783 over the week ending May 29, the previous high. A new high daily record was set June 12, with 6788, a gain of seven over May 28. Tractor production in the week was 2698, and Lincoln manufacture 174.

On June 8 the company built engine number 7,777,777, the engine going to the Los Angeles assembly plant.

RAIL CAR OUT OF DES MOINES

DES MOINES, IOWA, June 12—An eighty-passenger gasoline motor-driven coach has made its initial trip out of Des Moines over the Chicago, Milwaukee and St. Paul railroad. Round trips are made between Des Moines and Boone and between Des Moines and Madrid. It is said that other coaches of a similar nature for short runs and light hauls will be added if the experiment is successful.

EATON AXLE DIRECTORS

CLEVELAND, June 14—Four new members have been added to the board of directors of the Eaton Axle & Spring Co. of this city, the stockholders, at a meeting held here, selecting the following: Edward B. Green, Charles L. Bradley, E. V. Walker and W. Forbes Morgan. The company is the result of a merger of the Torbensen Axle Co., the Eaton Axle Co., the Perfection Spring Co. and the Pontiac Spring Co.

Agricultural Districts This Year Will Continue Strong Interest in Purchase of Open Cars

By HENRY KROHN,

Vice-President in Charge of Sales of the Paige-Detroit Motor Car Co. and Jewett Motors

Detroit, June 11.

IN the absence of any one fundamental reason why business should not continue to remain at a high point throughout the year, I regard it as extremely foolish to give serious thought to the possibility of any pronounced falling off. The country is blessed with plenty of money, there is no over-production, crop prospects are bright, and prices have not been inflated. Facing facts like these there is no reason for anticipation and we are laying our plans for continued operation on facts.

There will be a falling off in automobile manufacturing and sales from the early months of the year, that is to be expected. Differences in the season would cause that if nothing else but there will be a good strong seasonal demand through the year that will keep the better factories at close to capacity. Factories which have been getting the overflow business through the early part of the year probably will suffer considerably as the leaders are able to take care of all orders offered.

Selling in the latter part of the year is going to require effort. All of the easy business will have been disposed of in the first part of the year but there will be plenty of hard business to go after. Manufacturers whose product is right, whose prices are not too high, who back these with right sales and advertising effort, and whose distributing organization is sound will have no difficulty in keeping business volume high.

There is a considerable number of used cars in the hands of dealers but no more than there should be at this time of the year. Dealers are getting wiser all the time and the used car situation reflects this. Trade-ins are not accepted any more that are not easily movable. They have got away, too, from keeping all their high powered salesmen on new cars, and are giving a lot more of their merchandising attention to used cars. Most of the used car difficulty in the past has been through expecting one salesman to sell all the used cars that eight new car salesmen could take in.

We are not expecting any extreme movement toward closed cars in the remainder of the year. The trend undoubtedly is all in that direction but there is a large amount of open car buying still to be reckoned upon. As long as there is a market for open cars manufacturers must build to meet the market, and there will be a market for them as long as the price differential between the two types is marked. As the amount of difference is decreased it is fair to assume that the closed car buying will extend.

Buyers in the agricultural and community districts will continue to be open car buyers for a long time because of seasonable conditions. Cars can be operated in the outlying districts only during the good months of the year anyhow and buyers do not desire to have the extra money tied up in the closed body. City buying undoubtedly will be largely closed car. One reason why the open car buying this year has been slow generally is that the agricultural market has been slow in opening up. We are looking forward to a greatly increased market, however, as the crop season advances.

Peerless Plan Dropped, Stockholders Informed

CLEVELAND, June 12—The Peerless Truck & Motor Co. has advised its stockholders that, after counsel had investigated the legal steps necessary to merge the operating company with the holding company and change the $50 par stock to stock of no par value, it was found that no particular advantage would accrue to the company. As a result no further steps will be taken at this time looking toward a consummation of the plan.

BAY STATE GASOLINE TAX

BOSTON, June 11—The Governor of Massachusetts has signed the bill putting a two-cent tax on gasoline. A referendum provision is attached.

Seasonable Weather Will Move Open Cars

Stocks Have Accumulated Due to Late Spring—Closed Type Sales Good

NEW YORK, June 11—More seasonable weather is acting as a stimulus to sales of automobiles in sections of the country where a slight lagging in purchasing has been apparent. This will prove of material aid in reducing the stocks of open cars which have accumulated in dealers' hands due to a backward spring.

Closed car business generally continues in good volume, with body manufacturing plants working at capacity to meet current and back orders. Deliveries are somewhat slow owing to the heavy pressure exerted on builders by car producers and limited facilities to cope with it. Increased plant accommodations now under way will relieve the body situation to an extent and afford means of preventing the high piling up of orders which is now experienced.

With automobile manufacturers, operations are keeping at a high level, although there is little expectation of meeting the May record this month. Exceptionally high schedules by some of the major producers, with an improvement in the programs of others toward the end of the month brought the aggregate output of cars and trucks in May to 405,000.

Increase in Truck Output

This is estimated to be 20,000 more cars and 3000 more trucks than were built in April, which up to that time had held the production record, and is surprising in view of the high marks established during the last twelve months and a season when a slackening in both sales and factory operations is to be expected.

The figures are indicative not only of the advance in automobile output but of the steady movement forward in the truck branch of the industry, where increased production necessarily is slow and where growth is dependent upon industrial expansion. As long as conditions throughout the country remain good, the forward trend will continue, and schedules will be moved up conservatively with the idea of re-establishing this branch on its previous footing.

There is a strong demand for the lighter duty trucks, although commercial centers are increasing their call for the heavier vehicles. Farmers are good buyers, agricultural conditions tending toward extending sales possibilities in those sections. This is particularly true in southern territories where the outlook for a good cotton crop commanding high prices is reported to be excellent. Tractors are being bought in heavier volume through the Southeast, and manufacturers are looking for a continuance of a wholesale business there.

Parts makers report no let-up in operations, the majority of plants having all the business they can handle and still being somewhat behind in deliveries. The shortage of raw and semi-finished material and the scarcity of labor are factors in holding back output with many makers. Collections are excellent, which has been a prevailing condition in this branch for a number of months.

RAILWAYS IN TEXAS CAN OPERATE BUSES

AUSTIN, TEX., June 12—Governor Pat M. Neff has signed the bill which permits street car lines and motor bus lines to be operated by the same company. It goes into effect June 14.

It is stated that a number of street railway companies will avail themselves of the new law and place motor buses in operation in connection with their street cars. This is said to be especially true of companies that operate in cities where there is "jitney" competition.

The Houston Electric Co. will probably establish a number of motor bus lines, according to W. E. Wood, manager. The new law will enable street railway companies to extend their service to outlying communities where the population is insufficient to justify extensions of street railway lines, it is stated.

DEPENDABLE ELECTS OFFICERS

GALESBURG, ILL., June 11—The Dependable Truck & Tractor Co. stockholders heard an encouraging report of the year's business and the 1923-24 outlook at their annual meeting. C. V. Morse was elected president; A. E. Patchin, vice-president and A. R. Knox, secretary-treasurer. Two new directors elected are C. V. Morse and A. R. Knox.

MARLIN PROPERTY SOLD

PHILADELPHIA, June 11—The Marlin-Rockwell Corp., now exclusively manufacturing ball bearings, has sold its Philadelphia properties and its stock holdings to the Raybestos Co., in pursuance of its policy to liquidate plants and properties not useful in the conduct of its business. The principal property remaining unliquidated is the Braeburn Steel Co. in Pittsburgh.

Booth Elected Head of Republic Rubber

Served as Receiver for Old Company—Watson Chosen as Chairman of Board

YOUNGSTOWN, OHIO, June 11—The Republic Rubber Co., recently acquired as a subsidiary of the Lee Rubber & Tire Corp., has completed its organization with C. H. Booth, receiver of the old Republic, as president.

The chairman of the board is John J. Watson, Jr. Other officers include Edward F. Fitch and A. A. Garthwaite, vice-presidents; C. F. Garrison, secretary, and H. H. Stambaugh, treasurer.

The directors are John J. Watson, Jr., A. A. Garthwaite and H. E. Field, New York; John Kearns, Philadelphia, and C H. Booth, Edward F. Fitch, J. H. Connors, L. A. Watts and J. T. Harrington of Youngstown. The eastern members are identified with Lee Rubber and those from Youngstown were connected with the old company

The executive committee consists of Watson, Booth, Kearns, Field and Garthwaite. Kearns, general manager of the Lee Tire & Rubber Co. of Pennsylvania, is chairman of the manufacturing committee; Field, general manager of sales of Lee Tire, chairman of the committee on sales, and Garthwaite, vice-president and treasurer of Lee Rubber, chairman of the finance committee.

Capitalization Provided

The new company will have 50,000 shares of no par value common stock, all owned by Lee Rubber, which has issued 65,000 shares of an authorization of 150,000 shares, bringing the total to 300,000 shares, to pay creditors' claims aggregating $5,534,520. Other funds on hand will meet receivers' obligations to the extent of $2,000,000. There will be no funded debt against the company.

Additional equipment for the manufacture of solid tires will be installed and other minor improvements made at this time.

Buick Produced 19,500 Cars, New Mark, in May

DETROIT, June 11—Production of the Buick Motor Co. in May approximated 19,500, the highest mark the company has yet made. Average output for the last six months has been 16,700 cars, the top month previous to May being April with 19,000. Since the introduction of its present model the company has increased from a previous high record of 13,200, the acquisition of the former Scripps-Booth plant here making a large part of the increase possible.

The highest single day's production was on April 17, when 962 cars were built. A new record for daily shipments was made on June 6, when 366 freight cars carried 1237 automobiles.

Chrysler Definitely with Maxwell Motor

Will Devote Himself Exclusively to Organization—Holdings Enlarged

DETROIT, June 9—Walter P. Chrysler announces that he has made a large increase in his holdings in the Maxwell Motor Corp. and that he will be identified permanently and exclusively with the corporation from this time forward. Until now Chrysler has been associated in other activities from time to time, his most recent connection being as executive vice-president of Willys-Overland. The announcement this week places him definitely with Maxwell.

Three years ago he was retained, following his successful working out of the reorganization of the company, as chairman of the board of directors and also chairman of the executive committee. At that time he was also connected with Willys actively and did not enter into an exclusive agreement or agree to permanent association. He has maintained offices in New York and as consultant and advisor in motor car matters has been much sought by financial houses.

Present models of the Maxwell and Chalmers line were developed under his direction. The popularity enjoyed by these models together with economies effected in the plants has placed the company in a strong financial position; its recent statement showing a paying off of approximately $8,000,000 in notes in two years reflects this.

M. A. M. A. Fall Meeting Will Be Held in Boston

NEW YORK, June 11—The Motor and Accessory Manufacturers' Association will hold its fall meeting, which is featured by its credit conference, in Boston the week of Sept. 19. The program is now being arranged and so far two topics for discussion have been put on the card.

One of these is the question of service for the consumer's benefit and the other is the possible restriction of the automobile market because of traffic conditions, a peril that was pointed out by Alvan Macauley, president of the Packard Motor Car Co., in his article on "The New Saturation Point," published in AUTOMOTIVE INDUSTRIES in the issue of June 7.

AUTO BODY OPERATIONS

DETROIT, June 9—Officials of the Auto Body Co. declare that the outlook is favorable for 100 per cent increased business this year over last, and at prices that will show a larger margin of profit. The company is entering the sixth month with overtime operations in some departments and the plant at full capacity. The first five months have shown largely increased business over last year. Additions are being made to production facilities.

M. A. M. A. PUBLISHES YEAR BOOK FOR 1923

NEW YORK, June 11—The 1923 Year Book of the Motor and Accessory Manufacturers' Association has been mailed to members. It is an attractive little publication prepared by M. Lincoln Schuster, assistant to the general manager and manager of the Educational Department.

Annual reports, a list of members, and valuable statistics are given, the frontispiece being a colored reproduction of the Spirit of Transportation, one of the prize winners in the series prepared by the Clark Equipment Co.

Who's Who at Association's Headquarters introduces pictorially the men who are responsible for the M. A. M. A.'s activities and also shows views of the executive offices.

Ford Must Start Building at St. Paul by September 1

WASHINGTON, June 8—Authority has been given by the Federal Power Commission to the Ford Motor Co. to construct a power plant at High Dam, near St. Paul, Minn. The license was signed today and Ford is required to begin construction of the plant Sept. 1, 1923, completing it July 1, 1925.

The privilege is given for a fifty-year period, with an annual payment to the United States Government of $95,440. The Ford company has advised the commission that it will undertake the work immediately, and a factory will be built near the power site. The Ford plans call for a complete factory employing from 10,000 to 14,000 men. The plant and power-house will cost $10,000,000.

A. O. Smith Acquires Fund for Expansion in Future

MILWAUKEE, June 12—A trust mortgage and deed for $5,000,000 has been given by the A. O. Smith Corp. to the First Wisconsin Trust Co. as trustee. The proceeds are to be used to retire a $2,800,000 note issue, for purchase of new automatic machinery and for a fund for such expansions as the company may decide on in the future. The machinery is to go into the company's new building, recently completed at Twenty-seventh Street and Keefe Avenue.

"While there are no plans for immediate expansion, the company has developed rapidly in the past, and the money is to be kept on hand for gradual enlargement," said L. R. Smith, president and general manager.

Mitchell Receiver to Act as Trustee

Appraisers Appointed—Company Lost Heavily Through Selling Below Cost

RACINE, WIS., June 11—Herbert F. Johnson, receiver of the Mitchell Motors Co., was elected trustee of that company at the first meeting of the creditors. Thomas Nimlos of Milwaukee was a candidate for the position, his name being offered by men who represented Milwaukee creditors, but Johnson received so great a support from the heaviest creditors that the men who were supporting Nimlos asked permission to change their votes, and the election of Johnson was almost unanimous. Johnson filed a $50,000 bond, and at once assumed charge of the motors company which was forced into bankruptcy.

Referee in Bankruptcy M. J. Knoblock appointed R. O. Hendrickson, J. A. Gemmill and M. C. Bias, all of Racine, as members of the board of appraisers to determine the value of real estate, buildings, stock and material owned by the Mitchell company. The appraisers will meet the first of the week and will submit a report to the referee in bankruptcy June 14 .

It was stated at the meeting that the Mitchell company sustained an operation loss of $2,000,000 in 1922, due to the inability to sell automobiles at a profit, the cars being sold at less than cost of production.

Government to File Claim

The report of the receiver showed that he has disposed of several automobiles stored in Racine, Indianapolis and Phoenix, and that he also sold a large number of tires for which he received $26,818, although the inventory figure was $20,533. It was stated that the Government will file a claim against the Mitchell company for $400,000, that amount being alleged due for taxes for a period of three years. Edward L. Wratten, former traffic manager of the Mitchell company, has been appointed office manager of the company during the trusteeship.

Certain creditors of the company objected to rulings of the referee in bankruptcy which prevented them from filing their claims on the day for the first meeting of the creditors. The referee ruled that the claims should have been filed by May 30.

CUBA TAXES CARS AND PARTS

WASHINGTON, June 12—McKenzie Moss, Assistant Secretary of the Treasury, has advised the Collectors of Customs that automobiles, including lamps, rubber tires and other accessories and parts, not specified, are dutiable under the Cuban tariff when imported from the United States at the rate of 25 per cent ad valorem.

J. A. Allison Becomes Speedway President

Succeeds Carl G. Fisher, Resigned —Race to Be Held in 1924 Without Change

INDIANAPOLIS, June 12—Carl G. Fisher has resigned as president of the Indianapolis Motor Speedway Co., and James A. Allison, owner of the controlling interest in the track since 1917 and former treasurer, has succeeded him, this action being taken at a special meeting of the board of directors yesterday, when Fisher's resignation was accepted.

In making the announcement of the change in officers, Allison said that the 1924 race will be held May 30, with the usual cash prizes of $50,000, and that there is no thought at this time of abandoning the speedway plant or the race.

Interest appears keener than ever, said Allison, as evidenced by the fact that there now are on file in the speedway offices the entries of nine cars for the 1924 race. The cars entered are the teams of the H.C.S. and Packard Specials, one Durant Special and a 91.5 cu. in. car to be built by Harry Miller.

Arthur C. Newby has been elected vice-president of the Speedway company, and the former secretary, Theodore E. Myers, has been made secretary-treasurer.

Explaining the resignation of Fisher, Allison said that Fisher now lives in Miami during the Winter and recently purchased an estate in Long Island, where he expects to spend the remainder of the year. In view of these arrangements it would be impossible for him to devote the necessary time to speedway interests.

Fisher, Allison, Newby and the late Frank H. Wheeler built the speedway in 1909, and Allison acquired the controlling interest when he acquired the shares of Frank H. Wheeler in 1917.

The meeting proposed by Fisher between speedway and automotive leaders will not be held, according to one speedway official.

Hayden Back from Europe Reports Activity There

SPRINGFIELD, MASS., June 11—H. K. Hayden of the automotive equipment department of the Westinghouse Electric & Manufacturing Co., with headquarters in Springfield, has returned from a three months' trip through Europe, where he made a survey of the automobile industries of England, France, Italy, Belgium and Czecho-Slovakia.

Hayden reports that the industry is active on the Continent and reflects a degree of industrial recovery which promises to continue. Plans for greater activity next year are reported by all manufacturers, despite the existing political uncertainty.

The great majority of cars are designed with low fuel consumption as the chief requisite, which entails an almost continuous round of gear shifting, he states. There seems to be no objection to this, however, on the part of the user, who is not willing or prepared to pay for the refinements of driving to which Americans are accustomed.

While in Milan, Hayden visited the Industrial Exhibition which opened on April 12. This was a comprehensive exhibit and included all the Italian cars, fourteen other European cars, one American car and one American accessory manufacturer's exhibit.

Argentina May Change Duty Levying Method

BUENOS AIRES, ARGENTINA, May 23 (*by mail*)—It is probable that no decision will be reached for some months on the proposal to change the Argentine tariff on automobiles to a weight basis.

Distributors fear, however, that the method of levying the duties will be altered from the present ad valorem basis, as statements have been made by the president of the Tariff Commission indicating that the commission favors the original proposal to change the tariff laws.

The proposal to change the Argentine automotive tariffs came up several months ago, and various rumors have been received in the United States relative to it.

Numerous importers of American cars joined together, through the Chamber of Commerce of the United States in the Argentine Republic, in presenting a petition to the Tariff Commission setting forth the discrimination that would result if the duties were levied upon a weight basis instead of on factory prices, as at present. The petition, according to reports, was favorably received.

May Biggest Hupp Month in Shipments and Sales

DETROIT, June 9—Hupp Motor Car Co. shipments in May were 4327, eclipsing all previous records. According to C. O. Hutchinson, general sales manager, incomplete reports from distibutors and dealers throughout the country indicate that May was also the greatest sales month the organization has enjoyed.

There is no indication of any let up in demand for Hupmobiles, Hutchinson says. Distributors have been informed that allotments for June must be cut 40 per cent through inability of the corporation to make up back orders. Sales in the South he reported as surprisingly heavy and in the agricultural districts better in the past eight weeks than at any previous time. Continued good business from these districts is looked for.

Shipments in the first five months of the year are reported at 20,998, more than half of the 40,000 production schedule set for the year.

Ford Motor Reaches Twentieth Birthday

Since Its Incorporation It Has Built 7,750,000 Cars and Trucks

DETROIT, June 13—The Ford Motor Co. will be twenty years old Saturday. Its birthday will find it enjoying the greatest prosperity in its history and carrying out an expansion program of great magnitude, executives say. Since its incorporation on June 16, 1903, the company has built more than 7,750,000 cars and trucks, and this year will make about 1,500,000.

Facts recalled by the anniversary of the company show that the capital originally subscribed was $100,000, of which only $28,000 was in cash paid into the treasury. Among the twelve stockholders with the company at the start, Henry Ford held 25 per cent of the stock. In 1907 Ford acquired additional stock, sufficient to bring his holdings to 58½ per cent. When Edsel Ford became president in 1919, he bought the remaining 41½ per cent outstanding, and the company was reorganized July 9 that year with authorized capital of $100,000,000.

Built 1708 Cars First Year

The first car manufactured by the company was on the road in June, 1903, and sold the early part of July. In the initial twelve months the company built 1708 cars. In 1908 the first model was placed on the market.

A summary of the holdings of the company today shows two main plants here with other manufacturing units at Hamilton, Ohio; Northville, Mich.; Troy, N. Y., and Iron Mountain, Mich. The company controls its own coal supply, with mines in West Virginia and Kentucky, and iron mines and timber land in northern Michigan. It has glass plants at Glassmere, Pa., at the Highland Park plant and is building one at River Rouge. It is building a $1,200,000 engineering laboratory at Dearborn.

Extent of Holdings

There are thirty-four assembly branches in the United States. With 9000 dealers and about 15,000 authorized service stations, there are 24,000 points of contact. Foreign branches and associated companies are at Manchester, England; Copenhagen, Antwerp, Buenos Aires, Sao Paulo, Montevideo, Havana, Barcelona, Bordeaux and Trieste. There is also a manufacturing plant at Cork. Ford Motor Co. of Canada, Ltd., has an output of 75,000 yearly.

The first tractor was brought out in 1917, and during that year 254 were sold. Present production is about 500 daily. The Lincoln plant was acquired in 1922 and now is a division of the company with annual capacity for 10,500 cars. The Ford railroad, the Detroit, Toledo & Ironton, connects with practically every transcontinental line.

New German Engine Runs on Crude Oil

Demonstration Given in New York by Newly Organized American Company

NEW YORK, June 12—The American Crude Oil Motors Corp. has been formed for the purpose of exploiting in this country the Acro crude oil engine of German design. A. Wielich is at the head of the organization.

The company has brought over the first of the engines, with Dr. Franz Lang of Munich, the inventor, in charge, and is displaying it at 153 Hudson Street, this city. The engine has not been put into production either in Germany or this country, but efforts will be made to interest American manufacturers in the invention.

Dr. Lang, a former associate of Dr. Diesel, demonstrated the possibilities of his engine today. It operates as a low-pressure Diesel type with solid fuel injection, no ignition apparatus, air pump or tanks being required. The model demonstrated is of the single-cylinder two-cycle type of 5 21/32 in. bore and 6¼ in. stroke and shows an excellent power output, with a low fuel consumption and remarkable flexibility under both no-load and full-load conditions. Operation on any hydro-carbon oil is feasible.

Although the engine shown is of the stationary type, this fuel system already has been applied successfully to a German truck engine of the four-cycle type, having four cylinders of 100 mm. bore and 120 mm. stroke, using a single fuel pump of variable output and a rotary distributor to deliver the fuel through tubes to the four injection valves inserted in the spark plug holes.

Dr. Lang expects to have a single-cylinder passenger car engine equipped with this system upon exhibition within a few weeks.

Low and Medium Priced Cars Gain in New York

NEW YORK, June 13—A slight increase in registrations of low and medium priced cars and a decline in those of higher priced cars in the Metropolitan district during May as compared with April are shown in the analysis of automobile sales as compiled by Sherlock & Arnold.

For the first five months of the year low and medium priced car registrations aggregated 36,128 as against 27,491 for the same period in 1922 and 15,564 in 1921. In the higher priced field registrations for the period reached 3648 as compared with 3011 in 1922 and 1996 in 1921.

In the low and medium priced field two cars are well in the lead for the five months' period with registrations in excess of 5000, while three are above the 3000 mark and three others above 1000. Of the remainder, eight show registrations greater than 500.

One car in the higher priced field has in excess of 1000 registrations to its credit, another is above the 800 mark and six surpass 100.

Recapitulation by months for this year is as follows:

	Medium and Low Priced	Higher Priced
January	2,814	201
February	2,801	580
March	8,102	769
April	11,124	1,106
May	11,287	992
Total	36,128	3,648

Moon Prices Continue as Previous to June 1

ST. LOUIS, June 11—Prices of Moon cars have not been advanced $100 on each of the models, as was reported a week ago. The company states that during May there was some talk of the necessity of increasing prices June 1, and distributors were told to be prepared for such an advance, if it should be found necessary.

However, at the end of May the company decided not to change the list, and so the prices remain as follows: 6-40 phaeton, $1,295; 6-40 roadster, $1,295; 6-40 sport phaeton, $1,495; 6-40 coupé, $1,585; 6-40 sedan, $1,695; 6-40 sport sedan, $1,895; 6-58 seven-passenger phaeton, $1,785; 6-58 sport touring, $1,995; 6-58 sport phaeton, $1,995; 6-58 seven-passenger sedan, $2,485; 6-58 Petite sedan, $2,585.

Buick Price Reduction Made by Dealer in Rio

RIO DE JANEIRO, May 8 (*by mail*)—Mestre & Blatge, Buick dealer here, has reduced the price of the four-cylinder five-passenger phaeton model. It is stated that the cut has disturbed other dealers and may result in a price cutting campaign.

The reduction in price was unexpected, as there had been some discussion as to increases, owing to the low exchange value of the milres. The latest quotations for this Buick model is now 12 contos instead of 13 contos.

At the present rate of exchange a conto is equivalent to $104, American money.

FORD OUTPUT IN MAY

DETROIT, June 11—Ford Motor Co. reports output of cars and trucks for May at 170,992, as compared with 121,073 in the same month last year. During the week ending June 5, a five-day week, production aggregated 34,730. Tractor output was 1930 and Lincoln 157.

NO COMPULSORY INSURANCE

BOSTON, June 11—A bill to compel all motorists to take out insurance was lost in the closing hours of the Legislature.

Cole Is Producing New Master Series

Open Models Retail at $2,175 and Closed Range from $2,750 to $3,175

INDIANAPOLIS, June 13—Cole Motor Car Co. of this city announces a new series of Cole Master Models in six body styles, two open styles of which will sell at retail at $2,175, while the closed cars range from $2,750 for the Imperial Coupé to $3,175 for the Royal Limousine, a seven-passenger design. Three open styles of the Cole 890 Models are continued; the seven-passenger phaeton, the four-passenger phaeton and the two-passenger roadster are $1,885, plus freight and Federal tax.

The chassis with certain refinements and minor changes in detail continues along Cole lines made familiar by the 890 series. The engine is a V type, eight cylinders, with a bore of 3½ by 4¼ stroke. The wheelbase is 127½ in., with a frame of special alloy steel tapered at the front to permit short turning radius, and widened at the rear for rigid body support. The equipment is most complete.

The body styles of the Master Model series comprise the following:

Open Styles

Volante, four-passenger	$2,175
Westchester, seven-passenger	2,175

Closed Bodies

Royal Limousine, seven-passenger	$3,175
Royal Sedan, seven-passenger	3,075
Brouette, four five-passenger	3,075
Imperial Coupe, four-passenger	2,750

Cole 890 Models are as follows:—

890, seven-passenger phaeton	$1,885
890, four-passenger phaeton	1,885
890, two-passenger roadster	1,885

Reo's Shipments in May Established New Record

DETROIT, June 11—Reo Motor Car Co. set new high shipment records in May, exceeding March of this year, which was the previous high month, by a large margin and running 35 per cent in excess of last May. In making the record there was no forcing of shipments, said R. C. Rueschaw, general sales manager, but simply an effort to meet the demand.

Demand for Reo cars and speedwagons has been steady in every part of the country, Rueschaw says. At the present, he states, there is scarcely a territory containing soggy spots and business seems to be generally very healthy.

The outlook for late summer and early fall is equally promising, he declared.

The Reo plant will be closed the first two weeks of August to make necessary repairs and alterations, according to notices posted at the plant Saturday.

Fisher Common Stock Earned $32.98 Share

This Compares with $11.92 for Previous Year, Ending April 30, 1922

DETROIT, June 11—Fisher Body Corp. reports earnings of $32.98 a share on its common stock, 500,000 shares of which are outstanding, for the year ended April 30, 1923, $14,572,478 balance being available for common dividends after deducting depreciation, etc.

There also is available $2,358,700 for dividends on the 8 per cent cumulative preferred stock of the Fisher Body Ohio Co. for the period from April 1, 1920, to April 1, 1923, and $58,960 for accrued dividends on 8 per cent cumulative preferred stock of the Ohio subsidiary.

In the year ended April 30, 1922, the balance available for common dividends was $5,964,670, or $11.92 a share. For the year ended April 30 last, earnings and income from all sources amounted to $20,591,666 as compared with $9,155,545 in the preceding year. As of April 30 last the profit and loss surplus was $15,757,849, against $6,795,211 as of April 30, 1922.

In a statement to the stockholders, President E. J. Fisher says that during the year plans were effected which enabled the corporation to call for the redemption of all of its outstanding funded indebtedness and the preferred stock of the corporation; also to pay all of its bank indebtedness and to provide additional working capital.

The necessary financing was accomplished through the sale of $20,000,000 of the corporation's 6 per cent serial gold notes, having maturities extending over a period of five years to Feb. 1, 1928.

Following is the consolidated balance sheet as of April 30:

ASSETS

	1923	1922
Property account	$41,541,393	$24,255,695
Investments	423,617	4,376,543
Redemption funds on deposits with trustees	7,544,774	.....
Sinking fund for redemption Fisher Body Ohio Co. pfd	64,319	.....
Inventories	24,801,475	12,655,552
Notes recv. Chevrolet Motor Co. maturing Aug. 1, 1923	1,000,000	2,000,000
Customers' accts. notes receivable, etc	13,584,278	5,477,383
U. S. Treas. ctfs. of indebtds.	.....	120,000
Cash in banks and on hand	7,674,720	7,254,249
Deferred charges to future operations	1,850,070	893,207
Amt. advanced Fisher Body Ohio Co.	.....	800,000
Total	$98,484,649	$57,832,641

LIABILITIES

	1923	1922
7% cum. pfd. stock	.....	$3,150,800
Common stock	$29,711,324	29,711,324
Bonded debt	27,362,685	8,250,000
Notes payable	.....	2,560,000
Acct. payable, accrued int., accrued pay-rolls, etc.	12,795,930	4,312,570
Fed. and Canadian income taxes	2,480,000	1,193,435
Accrued divs. pfd. stock, Fisher Body Ohio Co.	58,960	.....
Reserves	1,443,129	1,859,300
Surplus	15,757,849	6,795,211
Total	$98,484,649	$57,832,641

MINES BUREAU FILMS WORKINGS OF ENGINE

WASHINGTON, June 11—Educational films showing the complete operation of a gasoline engine will be exhibited by the Department of Interior through the Bureau of Mines. It is intended to give automobile owners an intimate knowledge of the operation of an engine.

The Continental Motors Corp. cooperated with the bureau in the filming of the picture. Special views have been made to show the cycles through which the gas travels from the time it enters the engine until it leaves.

With the aid of special lenses, some unusual "close-up" scenes have been obtained. In order to show clearly what has taken place inside the engine and the particular role played by each part in creating power from liquid fuel, much elaborate work was done. To give this correct portrayal in every detail many engines were cut into at various points and made to operate so that the particular function of every moving part would be clearly shown.

Canadian Willys-Overland Engaged in Export Trade

TOLEDO, June 12—The entrance of Willys-Overland, Ltd., Toronto, into the export field has been made necessary as a relief measure, due to the domestic demand felt at the main plant at Toledo.

An official of the John N. Willys Export Corp. said:

The entire export field has gone ahead rapidly and most countries are back in the market for cars on a big scale compared with recent years.

This jump in demand at the very time when domestic sales have been on the climb has forced us to call on the Toronto plant for a large share of export business. Of course, we have to compete with Canadian demand there for cars, but by spreading the export business between the two plants we have been better enabled to handle our foreign business.

In addition to cars shipped to New Zealand and other inter-empire countries, the Canadian plant has shipped to Sweden, Holland, and will send out a considerable number of cars this summer to many other parts of the world.

Millionth Overland Turned Out June 12

First Car Was Built at Terre Haute, Indiana, Twenty-two Years Ago

TOLEDO, June 12—The millionth Willys-Overland car was turned out of the factory this afternoon. Chief Engineer A. J. Baker delivered the car to President John N. Willys; Willys drove it down the boulevard for a few minutes and turned it over to Charles J. S. Phillips, salesman with the branch for a number of years, who had already sold the car.

Mayor B. F. Brought and business men of Toledo were guests at a luncheon at the Administration Building today in honor of the event.

A number of luncheons have been arranged for the entire week of celebration here.

Jubilee Week Planned

In connection with the event dealers and distributors all over the world will celebrate Jubilee Week from June 18 to 23.

The original Overland car was designed and built at Terre Haute, Ind., in 1901 by Claude E. Cox, a youthful graduate of Rose Polytechnic Institute. It was an innovation because it had the engine mounted on the front axle. Soon another feature was added in seating arrangement and the four-door body became standard.

Charles Minshall, president of the Standard Wheel Works, Terre Haute, named the car "Overland," and the slogan was "Overland will get you there and back."

Later Overland went to Indianapolis and finally came to Toledo in the panicky days of 1907.

Now the plant is turning out more than 1000 cars a day. May set a new record with 22,282 cars.

Atlanta Branch Has Big May

ATLANTA, GA., June 12—According to an announcement by C. H. La Roux, manager of the Atlanta branch of the Willys-Overland Co., May was the biggest month in point of sales volume the branch has enjoyed since its establishment, 754 new cars being sold out of the branch during the month. All of these, however, could not be delivered during May. Orders on hand at the end of the month for delivery during June were 1026, the largest number in the history of the branch.

STUDEBAKER STOCKHOLDERS

SOUTH BEND, IND., June 12—Studebaker Corp. had 4754 common shareholders at the close of business May 10. Of this total 1724 had ten shares or fewer, 1331 from 11 to 25, 571 from 26 to 50, 436 from 51 to 100, 590 from 101 to 1000 and 102 over 1000.

Erskine Sees 1923 Nation's Best Year

Urges Spirit of Confidence and Optimism at Meeting of Indiana Editors

SOUTH BEND, IND., June 11—Before the Indiana Republican Editors' Association meeting here on Friday, A. R. Erskine, president of the Studebaker Corp., discussed "How Can We Maintain Our Existing State of Prosperity?"

Erskine declared that 1923 promises to be the most prosperous year in the history of the United States and he predicts a record never before reached by any nation.

"The maintenance of this prosperity should be the most vital concern of the constructive and educational forces of the country," he said. "It transcends in importance all political questions which agitate us, such as the Ruhr settlement, whether we shall join the World Court, whether Ford will be a candidate for President, the League of Nations, and others which are characteristic of the kind of things that usually occupy our minds.

Depressions Might Be Avoided

"The truth is that this enduring question of business prosperity has never been given the constant attention it deserves, and widespread distress and discontent have frequently beset us for our neglect. We have suffered business depressions which might have been mitigated or avoided altogether, and have come to the point of danger where some people accept the so-called 'business cycles' of the past as fate, and go so far as to suggest unemployment doles to tide over depressions."

Continuing, Erskine said:

There are certain hard facts underlying the conduct of business which cannot be ignored or sidetracked by emotional considerations. Business must be conducted on sound economic principles. Paternalism or gratuities are not sound economically, because all money engaged in business should bring a valid return. This does not refer to occasional donations, but to schemes injected into business which require constant payments of money without return.

Prosperity Can Be Maintained

Defining business as "organized society working to produce and distribute the things it needs," Erskine then said:

Let us understand that raw materials produced from the farms, mines, forests and waters of the country, and finished goods fabricated in homes and small shops for local consumption, and in large industries for national and international distribution and consumption, constitute the greater part of these needs.

Let us understand that distribution is made possible only by the existence of our splendid system of railroads, our motor vehicles, animals and ships. And let us not forget that all production is eventually consumed, in many cases quickly, by man, beast, and the elements. This is what makes business continuous.

With approximately three hundred billion dollars of national wealth, the greatest in history; with the widest recorded distribution of such wealth among the people; with the wants of one hundred and ten million consumers to be filled, and with the world's most extensive and efficient aggregation of industrial plants for mass production, the United States is equipped and possesses ample facilities to maintain this prosperity, even within itself, if need be, at intervals of foreign depression or derangement.

Our exports average but six per cent of our production, and hence we have by far the biggest and richest home market of any industrial nation in the world's history. Again, our producers are themselves the greatest consumers of their own production, and only need constant employment to insure national prosperity. No manufacturer, farmer or employer willingly curtails production, because it spells loss to him, and yet all of them are frequently induced by uncertainty and fear, or stated otherwise, by psychological influences, to curtail, discharge employees, and thereby create national depression.

After urging a spirit of optimism and confidence, Erskine concluded his remarks with saying:

"If our manufacturers, merchants and employers generally lacked faith in our national institutions and in the needs of our citizens, and should in consequence seriously curtail production, the psychological effect of such action would shortly be nation-wide in its harmfulness.

"But the mere fact that our big corporations and business institutions exist proves the faith of capital in our institutions and fellow men, and hence we never hear of business spreading a spirit of unrest and discontent."

Motor Wheel Sales Show 80 Per Cent Gain So Far

DETROIT, June 11—Motor Wheel Corp. sales in the first five months of this year were 80 per cent greater than in the same period last year, and equaled 70 per cent of the total business in all of 1922.

Orders on hand and business in prospect indicates a continuance of approximately present production during the rest of the year, according to C. C. Carlton, secretary. The acquisition of Disteel and Forsythe in the past few months is declared responsible for the increased business only to a definite extent. All plants are at capacity.

Davis Prices Man O' War Sport Roadster at $1,295

RICHMOND, IND., June 7—A new three-passenger sport roadster, known as the Man O' War, has been brought out by the George W. Davis Motor Car Co., the price being $1,295. Deliveries have already started.

The body is mounted on the Series 71 Light Six chassis. The finish is in Julian carmine, Royal blue or C. P. green with nickeled radiator. The upholstery is in brown Spanish leather.

11 Members Assured New Rubber Society

Proposed Association Not to Be Antagonistic to One Existing Now

NEW YORK, June 11—The Rubber Manufacturers Association will be formed at a meeting to be held in the Commodore Hotel Friday afternoon. Prominent in its organization will be Harvey S. Firestone, leader of the fight to interest Americans in the production of crude rubber. While Firestone himself has not signed the call for the organization meeting, it is generally understood that he has been the leading spirit in the preliminary steps.

The call was sent out under date of June 6 and was signed by T. R. Palmer, president of the Continental Rubber Works of Erie, Pa.; O. M. Mason, president of the Mason Tire & Rubber Co., of Kent, Ohio, and John J. Watson, Jr., president of the Lee Tire & Rubber Co. of New York.

"The feeling has been general for some time past that an association is necessary to deal exclusively with the problems of the rubber manufacturers," says the letter, which also adds that the nucleus of the new organization has been found in the Continental Rubber Works, Firestone Tire & Rubber Co., Lee Tire & Rubber Co., Manhattan Rubber Manufacturing Co., Mansfield Tire & Rubber Co., Mason Tire & Rubber Co., Murray Rubber Co., Nebraska Tire & Rubber Co., Quaker City Rubber Co., Racine Horseshoe Tire Co. and the Samson Tire & Rubber Co.

Rubber Association Intact

Those responsible for this preliminary action declare that in no way will the Rubber Manufacturers Association be antagonistic to the Rubber Association of America; in fact it is said that those who are interested in the new movement and who are members of the latter organization will retain their memberships.

It is said that the reason for forming the new body, which will be open only to rubber manufacturers and not rubber importers, is that there are many things of vital importance to manufacturers that an association like the new one can handle to better advantage than could the Rubber Association of America.

One significant fact in connection with the promotion is that Firestone is billed

(*Continued on page* 1307)

STOCKHOLDERS IN G. M. C.

NEW YORK, June 12—At the end of the second quarter of 1923 General Motors Corp. had 45,921 common stockholders, 3393 6 per cent preferred, 9580 6 per cent debentures and 8523 7 per cent debentures. This was about the same total the corporation had at the end of the first quarter.

Men of the Industry and What They Are Doing

Seger Succeeds Gunn

J. N. Gunn, for the last eight years president of the United States Tire Co. and vice-president of the United States Rubber Co., has resigned both offices, according to an announcement made by C. B. Seger, president of the United States Rubber Co., who states that he will assume direct charge of all activities of the tire division of the company. He also will be elected president of the United States Tire Co. C. J. Butler second vice-president, will have general charge of all manufacturing activities, and G. S. Shugart, second vice-president, will handle sales as heretofore, both reporting directly to the president. While Gunn has not announced his future plans, it is surmised that he will reenter the field of professional engineering and management.

Swayne Railroad Director

Alfred H. Swayne, vice-president of the General Motors Corp., has been elected a director of the Lehigh Valley Railroad, to succeed the late Charles D. Norton.

Bruce Heads Piston Ring Company

Albert C. Bruce, formerly vice-president and general manager of the American Hammered Piston Ring Co., has been appointed president, succeeding C. F. Hockley, whose duties as vice-president of the Bartlett-Hayward Co.—the parent company of the American Hammered Piston Ring Co.—require practically his entire time. Hockley will continue as chairman of the board of directors of the piston ring company. W. C. Stettinus, sales manager of the equipment division, has been made first vice-president and general manager. Thomas B. Blakiston, in addition to serving as general sales manager of the replacement division, has been appointed vice-president. Joseph S. Jacobs, former secretary and assistant treasurer, has resigned to associate himself with the Bartlett-Hayward Co. as sales engineer in the gas division.

Thomas with Dow Chemical

Charles C. Thomas, formerly headquarters engineer of the Vacuum Oil Co. at Detroit, has taken over the commercial engineering work on the Dow metal piston for the Dow Chemical Co. at Midland, Mich. Thomas has been connected with the industry for the last eight years in the sales, service and engineering field.

Brogan Forms Own Agency

G. W. Brogan, assistant to the president and advertising manager of the Black & Decker Manufacturing Co., has organized G. W. Brogan, Inc., a new advertising agency which will become operative Jan. 1. Brogan will handle a selected list of related accounts, specializing in the merchandising and advertising of concerns interested in the servicing of automobiles, trucks and tractors. These accounts will be limited to six noncompeting lines, one of which will be the Black & Decker Manufacturing Co. Brogan has been decidedly active in his line and was the organizer of the Service Equipment Associates, made up of a number of concerns specializing in service equipment.

Eaton Axle Appoints Mickey

Karl B. Mickey has been appointed advertising manager of the Eaton Axle & Spring Co. of Cleveland, with headquarters at the Perfection Spring plant. Mickey formerly was identified with the Sherwin-Williams Co. and the House of Hubbell, both of Cleveland.

Fiero with White in Canada

A. Conroe Fiero has been appointed managing director of the White Co., Ltd., Toronto, as successor to Morse Fellers, resigned. Fiero formerly was located in Johannesburg where he maintained headquarters as divisional manager in charge of Africa for the export department of the White Co. Thomas B. Finnigan has been named manager of wholesale distribution at the Canadian plant.

Roos Elected Vice-President

D. G. Roos, chief engineer and production manager at the plant of the Locomobile Co., Bridgeport, Conn., has been elected vice-president of that unit of the Durant interests.

Ajax Promotes Hoblitt

Fred M. Hoblitt has been promoted from general sales manager to vice-president in charge of sales of the Ajax Rubber Co., continuing his headquarters at 220 West Fifty-seventh Street, New York City.

Van Riper Made Vice-President

L. M. Van Riper has been appointed vice-president in charge of sales by the Racine Rubber Co. He has been general sales manager for the past year. Following the change, the company has decided to transfer the sales office from the factory at Racine, Wis., to 222 West Fifty-seventh Street, New York City.

Schultz Joins Yellow Cab

L. H. Schultz, for the past fourteen months identified with the Bureau of Foreign and Domestic Commerce of the Department of Commerce as assistant to the chief of the automotive division, has resigned to take up work in the export department of the Yellow Cab Manufacturing Co. of Chicago in September. In the meantime he will make a trip to Spain to report on automotive merchandising and servicing conditions.

A.E.A. Convention Arrangements Made

General and Group Sessions to Be Held—Committee Meetings Scheduled

CHICAGO, June 13—The summer meeting of the Automotive Equipment Association is expected to prompt an assemblage of five to six hundred manufacturers and jobbers and their families at the Balsams Hotel, Dixville Notch, N. H., from June 25 to July 1. General sessions will be held Wednesday, Thursday and Friday of convention week, and group sessions of the manufacturers and jobbers will be held separately on Wednesday.

The convention will hear a report of progress of the merchandising campaign, inaugurated two years ago at Mackinac Island. A. R. Mogge, now in charge of the work, will present a detailed report.

During the week there will be meetings of the board of directors and the following committees: Membership, vigilance, universal catalog, railroad classification, standardization, highways, foreign trade, merchandising, State vice-presidents.

Special trains to the convention will be run from Chicago and Detroit, with part of the journey made by boat down the St. Lawrence River and Lachine Rapids. Many delegates from the East will make the trip by automobile.

Multibestos "Open House"

WALPOLE, MASS., June 13—The Multibestos Co., manufacturer of brake and clutch linings, will keep "open house" at its factory in this city from June 18 to July 7 incident to the summer meeting of the Automotive Equipment Association.

Holler Durant Manager at Flint

W. E. Holler, brought from Flint, Mich., to New York City to become assistant to the president of Durant Motors, Inc., has been named as general manager of the Durant interests at Flint, effective July 1. In that position he will have full charge of the Flint Motor Co. and the Star Motor Co. Holler formerly was manager of the Flint Chamber of Commerce, following which he became general manager of the Imperial Wheel Co.

Dinner for Frank H. Lord

Frank H. Lord of the advertising department of the Cadillac Motor Car Co was tendered a farewell dinner by his associates prior to taking up his new duties in the copy department of the Campbell-Ewald Co.

11 Members Assured New Rubber Society

Proposed Association Not to Be Antagonistic to One Existing Now

(*Continued from page* 1305)

to address the meeting of the Midwest Rubber Association in Chicago tomorrow. This is interpreted to mean that the Westerners may be interested in the new proposition inasmuch as some months ago there was talk of the association merging with the Rubber Association of America.

Up to now no definite steps have been taken in this direction, but it is thought that the new Firestone plan may appeal to the Midwest people, especially as the Nebraska Tire & Rubber Co., is listed as a prospective member and W. W. Wuchter, past president of the Midwest, is a Nebraska company executive.

Speaks in Chicago

CHICAGO, June 12—Advocacy of a new association, to be composed exclusively of rubber manufacturers, and explanation of his action in reducing tire prices 10 per cent were features of an address before the Midwest Rubber Manufacturers Association here today by Harvey S. Firestone, president of the Firestone Tire & Rubber Co.

Firestone recently announced his resignation from membership in the Rubber Association of America because of his belief that the association was not taking active steps to bring about the repeal of the Stevenson Restriction Act.

Firestone told of two meetings held recently, in Washington and New York, by a group of tire manufacturers who favor the proposal for a new trade association. As a result of these two meetings a call has been issued for a general organization meeting at the Commodore in New York City next Friday.

New Body Needed, He Says

In his address and, further, in an interview Firestone declared it was not the purpose of the new organization to rival or attempt to supplant the Rubber Association of America. It was his opinion that the Rubber Association represents too many diversified interests, including rubber growers, importers, brokers and dealers to act properly for the rubber manufacturers in questions pertaining to their own interests. He said the Rubber association cannot aggressive work for the repeal of the Restriction Act because a large part of its non-manufacturing constituency favor the act.

He declared that an organization composed exclusively of rubber manufacturers would have a large field of activity in this and in other questions relating to the manufacturing end of the industry. He also wants the collections of statistics of the rubber industry to be taken out of the hands of the Rubber Association, and the responsibility placed directly upon the Department of Commerce, all manufacturers reporting directly to the department.

Firestone referred to a number of unsatisfactory business practices in the industry which he believed such an association as is proposed could help to eliminate, mentioning particularly the long dating of invoices.

As to the price reduction, Firestone said that last Wednesday he went into his sales department and found many telegrams telling of price cutting here and there and heard reports of the slow moving of merchandise. The next day he called a meeting, and the price reduction was determined upon.

"I decided that tire prices would have to be stabilized," he said, "and that it would have to be on a lower level. I believe this action will help to stabilize the industry. We now intend to print our price lists and send them broadcast to the trade, so that all may know what Firestone prices are."

It was his opinion that tire prices would have to be lower than those now generally charged.

Manufacturing members of the Midwest Association, at an executive meeting following Firestone's address, discussed his proposal, but did not make any official recommendation concerning it. They voted to take steps to enlarge and build up their own organization. At their next meeting they expect to have as speaker A. L. Viles, manager of the Rubber Association.

Firestone and Miller Announce Price Cuts

(*Continued from page* 1298)

optimistic estimates predicted at the time of the enactment of the legislation.

The British rubber growers responsible for the legislation either cannot or do not wish to control the situation and enforce the law to the letter, because from information I have gathered I believe they now fear the results of strict enforcement, as it would cause a shortage of rubber and naturally strengthen those of us who are opposing the law. The restriction act provides that only 60 per cent of normal (1920) production shall be exported, but as a matter of fact close to 100 per cent is coming from the restricted area.

Theodore Weigele, Pioneer in Tire Industry, Is Dead

AKRON, OHIO, June 11—Theodore Weigele, pioneer in the tire branch of the automobile industry, died June 6 at Millersburg, Ohio, where he was identified with the McKone Tire & Rubber Co. Mr. Weigele began work in the rubber trade as a clerk in the Cincinnati branch of the Diamond Rubber Co.

With the advent and development of automobiles he became sales manager of the Diamond T line, giving up this work in 1911. Several years ago he returned to the rubber field, being associated with the Howe Rubber Co., New Brunswick.

New Line of Credit Information Opened

Directors of N. A. C. C. Accept Offer of Automobile Financing Association

NEW YORK, June 11—A new line of credit information has been opened up through the acceptance by the directors of the National Automobile Chamber of Commerce of the offer of the Automobile Financing Credit Men's Association to cooperate in stamping out such evil practices as duplicating financial transactions by unscrupulous dealers and in preventing as far as possible the financing of a car twice.

It is felt by the Automobile Financing Credit Men's Association that this will improve the dealer personnel and that by encouraging car manufacturers to submit to it the names of new dealers it will tend to prevent persons who have proved irresponsible in their dealings with finance companies and in the handling of automobile paper securing new contracts.

Better Paper As Result

This in turn will be reflected in the standing of automobile paper and its reputation with the banks. It will result in the securing of better dealers, it is thought, and the manufacturers will be able to exercise more care and discretion in selecting their retail representatives if the Credit Association can inform them of the records of the applicants.

The Automobile Financing Credit Men's Association was organized in 1919 by F. B. Taylor with seven companies in the membership. It has grown since then until now it has forty-eight members in New York City, among which is the General Motors Acceptance Corp. and twenty-four in Chicago. It checks all financial transactions having to do with selling automobiles on time and, since its organization, it claims to have turned up 5000 duplicate transactions and to have saved its members $700,000.

As showing the scope of its work, it recorded 95,892 mortgages in May of this year. In the same month it reported 658 conflicts in serial numbers, which prevented the financing of cars twice.

Statistics gathered by the association show that last year $1,600,000,000 worth of cars were sold through time payment sales, of which 66 per cent was handled by the Taylor organization. Of the 1922 production of passenger cars 73 per cent were sold on time payments, it is said.

HIGH SPRING OUTPUT PERIOD

DETROIT, June 13—The Detroit Steel Products Co., manufacturer of motor car springs, reports the largest spring production in its history during the three months' period, March, April and May. The total production for this period ran approximately 550,000 springs, sufficient to equip 137,500 motor cars.

S. A. E. Enrolls 685 for Summer Meeting

Event May Be Best Attended in Society's History—Program Arranged

NEW YORK, June 11—With 685 reservations actually enrolled, the summer meeting of the Society of Automotive Engineers, which will be held at Spring Lake, N. J., June 19-23, promises to be the best attended in the history of the organization.

As the program is arranged, the first day, Tuesday, will be devoted to the meetings of the Standards Committee, which will discuss recommendations that have been made by its various divisions. Those members not included in this committee's activities will have the day to themselves—they can get acquainted with the boardwalk or play qualifying rounds in the S. A. E. championship golf tournament. In the evening the semi-annual business meeting of tne S. A. E. will be held, and members-at-large of the Nominating Committee chosen. Dancing will follow the business meeting.

Paper On Oversize Tires

Wednesday has been set aside for recreational and social activities, including golf, baseball, tennis and trap shooting. In the evening a session will be held at which a paper on large-section oversize tires, prepared by James E. Hale of the Firestone Tire & Rubber Co., will be discussed.

There was a technical session Thursday morning, which will bring before the society several papers on representative types of brakes, these descriptions to be given by engineers representing the manufacturer of each particular type of brake. After this the four-wheel brake will come up for discussion, and plans have been made for demonstrations of cars with and without four-wheel brakes on the open road.

Thursday will be the annual field day of the society, with the running races and field events taking place on the lawn in front of the hotels and bordering on the ocean and boardwalk.

To Demonstrate Head Lamps

Head-lamp illumination will be discussed at the session on Thursday evening, with R. N. Falge of the research staff of the General Electric Co. submitting a paper which will be supplemented by an outdoor demonstration of headlamp adjustment, light distribution, glare measurement, special lenses and reflectors. The second speaker on the subject will be Dr. C. H. Sharp of the Illuminating Engineering Society.

On Friday the technical session will be devoted largely to the fuel volatility study which the S. A. E. has been carrying on at the Bureau of Standards. Prof. G. B. Upton will also contribute a paper at this session on recent investigations made at Cornell University bearing upon the improvement of fuel economy. The Bureau of Standards staff will bring one or more test cars for the inspection of members and also to demonstrate some of the test methods, notably the determination of the degree of crankcase oil dilution.

The swimming carnival and the finals of the other sporting events will be decided Friday afternoon, with the meeting winding up with the grand ball and the distribution of prizes.

Support Assured Hoover in Standards Handbook

WASHINGTON, June 11—Representatives of the Society of Automotive Engineers, the Society for Testing Materials, the American Engineering Standards Committee, the National Association of Manufacturers and other organizations have agreed to support the Department of Commerce in the publishing of a "handbook" on specifications and standards of 5000 varieties of commodities purchased by the Government.

Secretary Hoover declared that the specifications and standards being prepared are to cover Government purchases only, but said that ultimately it is expected they will govern buying for States, municipalities and public institutions. He also made it plain that the department is not imposing specifications or standards of any kind on private business. The work of preparing the specifications is in charge of the Federal Specifications Board and will bring about standards for Government purchases of all commodities.

Ash Scarce in South; Prices Continue Firm

ATLANTA, June 12—Lumber mill operators with southern headquarters in Atlanta advise that due to the active demand for thicker grades of white ash from automobile manufacturers of the North, there is a marked shortage of this lumber.

The demand is at least 25 per cent greater than the supply as Southern mills have been rendered inactive the past two months by inclement weather. Prices for the ash being taken by the automotive industry are firm, with 12/4 No. 1 Common quoted at $90; 1sts and 2nds at $125; 14/4 No. 1 Common is $95; 1st and 2nds, $130; 16/4 No. 1 Common is $105; 1st and 2nds, $140. Mills are acepting few orders for early delivery.

TESTIMONY IN PRESTON SUIT

BIRMINGHAM, ALA., June 11—Testimony has been taken in the controversy between John S. Coxe, receiver for Preston Motors Corp., involuntary bankrupt, and the Madison Bank and Trust Co. and the Priddy-Williams Co. of Memphis.

Representatives of the two Memphis concerns state that they are holders by pledge of $296,700 of the first mortgage bonds of the Preston corporation.

National Show Doors Opened to Taxicabs

N. A. C. C. Rules That They Are Passenger Vehicles and Entitled to Space

NEW YORK, June 11—The taxicab is a passenger vehicle, according to the decision of the National Automobile Chamber of Commerce, and as such is entitled to space in the National shows at New York and Chicago. Therefore, announcement is made that a taxicab division will be part of the annual displays of automotive products next winter, the first time recognition has been given this branch of the industry in the National shows.

The first step to gain this recognition was made during the Chicago show last February, when Gordon Lee, representing the Yellow Cab Manufacturing Co., appeared before the directors of the N. A. C. C. to argue on "What is a taxicab?" Lee disputed the claim that it was a commercial vehicle and pointed out that the Government evidently looked upon it as a passenger car, because it paid the same excise tax of 5 per cent as did the passenger car as the public understands it.

Decided at Annual Meeting

No definite action was taken at the time by the N. A. C. C., the question being referred to the show committee. The annual meeting of the N. A. C. C. last week voiced its approval when the committee declared its intention to give taxicabs a place in the big shows.

It is expected that this division will bring together an interesting display of taxicabs, which must be shown fully equipped. There now are a number of big companies engaged in the manufacture of cabs, these including the Yellow Cab Manufacturing Co. of Chicago, the Checker Cab Manufacturing Co., which recently purchased the Handley plant at Kalamazoo, Mich.; the Elcar Motor Co. of Elkhart, Ind., making the Diamond cab; the Barley Motor Car Co. of Kalamazoo, Mich., making the Pennant; Reo Motor Car Co. of Lansing, Mich., the Willys-Overland Co. of Toledo and others.

Unit Value of Casings Exported Set New Mark

WASHINGTON, June 11—Analysis of the tire export trade by E. J. Holt, assistant chief in the rubber division of the Department of Commerce, shows that "the single factor most responsible for increasing trade is the apparent ability and willingness of American tire exporters to sell at competitive prices in every foreign market."

The unit value of automobile casings exported in April set a new low record of $10.28, compared with $10.59 in March; the unit value of inner tubes dropped from $1.65 to $1.56.

Argentina Will Hold More Shows in 1923

Under Present Plan Other Large Cities Will Vie with Palermo Exposition

BUENOS AIRES, ARGENTINA, May 15 (*by mail*)—May 25, Argentina's Independence Day, will witness two rather notable events in the local automobile world. The first of these is to be a great parade through the principal thoroughfares of Buenos Aires of all classes of motor vehicles. In this parade there will probably be represented some fifty American manufacturers of passenger cars, about fifteen manufacturers of trucks and some eight to ten makers of tractors. The Argentine Touring Club, under whose auspices the parade is to be held, expects to make it a much larger one than that held last year.

Seek to Advance Road Law

During the time the above mentioned parade is being held delegates of the club in every part of the country will collect signatures to the petition to Congress requesting the prompt sanction of the National Road Law now pending before that body. It is hoped that hundreds of thousands of signatures will be obtained and that these will be taken as evidence by Argentine lawmakers that the time has come when public opinion demands that definite good roads' legislation be written on the statute books of the Republic.

The other event is the formal inauguration of the International Samples Fair that is being held under the auspices of the Government of the Province of Buenos Aires at La Plata.

Unfortunately it would appear that the petition of importers of American cars to the Minister of Finance asking that duties on automobiles and trucks be not changed from ad valorem to the weight basis will not meet with the approval of the customs house authorities. The hardships that this change in the tariff policy will work, if put into effect, on American importers through favoring European cars will undoubtedly prove a serious obstacle to the continued large-scale sales of American motor vehicles in this market.

Star Representation Placed

With the consignment of 150 cars, Star Motors, Inc., is beginning to get busy here. The representation for the Argentine Republic is in the hands of Messrs. Ditlevsen & Co., for many years Ford distributor in the province of Córdoba.

None of the first consignment of cars will be available for sale in the city since all of them have been taken up by agents in the interior. Large monthly consignments, however, have been arranged for. The price for the car has been fixed at $2.485 Argentine paper, at which figure Argentina should afford a growing market, especially in rural districts where this type of car shows up at best.

The agency of the Paige-Detroit Motor Car Co. has been placed with Harrods, Ltd., the largest and most fashionable department store in all South America with an automobile section, housed in a special building erected for the purpose of having one of the finest salesrooms in Buenos Aires. The new Jewett-Paige models are now being offered by Harrods and are attracting considerable attention.

Up to the present time the Ford Motor Co. has brought twenty-six Lincolns into Argentina and has distributed these among its agents in every large city in the Republic.

It is rumored that a considerable departure will take place this year as regards cattle shows. For the past forty years the Argentine Rural Society has centered most of its efforts in making the Palermo show the one big event of the year as regards beef cattle. However, an attempt is now to be made to divide the country into sections and have shows in the various large cities of the interior that will vie in importance with the Palermo exposition.

As the Palermo show has been used by automobile importers to make a first-class automobile exhibition it is probable that this branching out on the part of the Rural Society will furnish importers with the opportunity of holding shows in practically every city of the country where a large attendance is assured.

The general business situation in this Republic may now be said to have reached more or less normal levels and, judging from all indications, steady progress over a long period of years can be expected.

Fiat Again Acquires Ansaldo San Giorgio

PARIS, June 4 (*by mail*)—The Fiat Automobile Co. of Turin has purchased the Ansaldo San Giorgio engineering works in Turin. This establishment, which originally belonged to the Fiat company under the title Fiat San Giorgio, specialized in semi-Diesel stationary and marine engines and was sold to the Ansaldo company shortly before the war. At one time employing 8000 workers, the staff at the Ansaldo San Giorgio dropped down to 300 a few months ago. Under the new arrangement the works will again be known as the Fiat San Giorgio and will continue in semi-Diesel engine construction.

A new company with a capital of 12,000.000 lire has been formed in Turin to take over the automobile branch of the Ansaldo Engineering Co. The Ansaldo, which is one of the biggest engineering organizations in Italy, entered the automobile business immediately after the war, but very shortly afterward was in financial difficulties by reason of the general business depression.

Highway Bond Issue Opposed by Dealers

Illinois Trade Says That State Has Sufficient Available Funds Now

CHICAGO, June 11—The unusual situation is presented in Illinois of the automotive trade and many motor clubs actively opposing a State bond issue for the construction of hard roads. Twenty-five members of the Chicago Automobile Trade Association appeared yesterday before the House Committee on Roads and Bridges to protest against a pending bill providing for a bond issue of $100,000,000 for roads.

The Illinois Automotive Trade Association and local associations throughout the State, as well as commercial and banking associations, have gone on record against the bill, which is sponsored by Gov. Small as an administration measure.

The opposition of the automotive trade to this bill is not because of lack of appreciation of the stimulus that good roads give to the automobile business. This State in the last two years has built hundreds of miles of hard roads, and the automotive trade has profited thereby. These roads were built from the proceeds of a $60,000,000 bond issue, of which probably one-half is still available for projected road construction.

It is the contention of the automotive interests that the funds available from this bond issue and from automobile licenses and other sources will provide for construction in the next few years of all the road mileage that will be possible with the available labor and material supply. They believe that an additional bond issue would result in inflation of material prices, shortage of labor and the squandering of money in the mad race of politicians to grab a portion for their respective communities.

General Airways System Organized in Milwaukee

MILWAUKEE, June 12—The General Airways System, Inc., an organization formed to engage in aerial transportation, has been formed under the laws of Delaware. Stephen J. McMahon, Milwaukee, senior member of the law firm of McMahon, McMahon & Hayes, is interested in the corporation and is its general counsel.

Others interested are Col. H. E. Hartney, who formed the National Aeronautic Association, and Fritz Cramer, son of a former Netherlands minister to the United States and also former representative of Fokker's interests.

The corporation is permitted to buy, sell and operate heavier-than-air machines for all commercial purposes. It is still in the state of organization and will not engage in actual operations for some time, according to the men promoting it.

New G.M.C. Booklet Covers Export Field

Stockholders Told of Organizations That Are Serving Overseas Trade

NEW YORK, June 13—Continuing its series of informative booklets to stockholders, the General Motors Corp. has issued one devoted to its affiliated export organizations—the General Motors Export Co. of New York, the Overseas Motor Service Corp. of New York, General Motors Limited, London, England, and General Motors of Canada, Ltd., of Oshawa, Ont.

Through these organizations, the corporation has placed overseas more than 12,000 Buicks, 29,000 Chevrolets, 5000 Cadillacs, 9700 Oaklands, 4200 Oldsmobiles and 3100 GMC trucks.

Sixteen Offices of G. M. Export

The General Motors Export Co. is not to be considered a commission house, the booklet says, having been organized as a consolidation of the existing departments of the various car and truck manufacturing divisions of General Motors. There are sixteen offices of the Export company located in Buenos Aires, Calcutta, Constantinople, Bombay, Copenhagen, Honolulu, Johannesburg, Melbourne, Mexico City, Paris, Rio de Janeiro, Shanghai, Soerarabia, Sydney, Wellington and Yokohama.

Handled from the executive offices in New York City are the territories of the Islands of the Caribbean, Peru, Colombia, Ecuador, Venezuela, Newfoundland, Central America and Central and West Africa. From these centers the sales and service activities cover 144 countries through 500 distributors and thousands of dealers and sub-dealers.

General Motors of Canada includes the McLaughlin Motor Car Co., Ltd.; Cadillac Motor Car Co. of Canada, Ltd.; Chevrolet Motor Co. of Canada, Ltd.; Olds Motor Works of Canada, Ltd.; Oakland Motor Car Co. of Canada, Ltd., and GMC Truck Co. of Canada, Ltd. The invested capital is $25,000,000, while the payroll is about $500,000 monthly. At Oshawa and Walkerville are factories where the Buick, Cadillac, Chevrolet and McLaughlin-Buick passenger cars are made for consumption in Canada and overseas.

Work of English Company

General Motors Limited is an English company affiliated with the General Motors Corp., distributing wholesale in Great Britain and Ireland the G. M. C. cars. There is a plant of over five acres in North London for the unpacking and assembling.

The Overseas Motor Service Corp. sells overseas AC spark plugs, AC speedometers, Klaxon horns, Delco and Remy starting, lighting and ignition systems, Hyatt and New Departure bearings, Jaxon rims and other trade marked essential accessories.

During the four years in which the Foreign Department has been in existence, its volume of business has averaged over $8,500,000 annually. In the first quarter of 1923 it transacted more than $4,000,000 of business, or on the basis of $16,000,000 annually. During 1922 it financed the requirements of 170 foreign distributors of the General Motors Export Co.

FINANCIAL NOTES

Goodyear Tire & Rubber Co. of Canada has declared its regular quarterly dividend of 1¾ per cent on the preferred stock, in addition to an extra dividend of the same amount on account of back dividends. The extra payment, which is the first on cumulative dividends since December, 1921, covers the period of the first quarter of 1921. Both dividends are payable July 3 to stockholders of record June 20.

Rickenbacker Motor Co. has authorized a 2 per cent cash dividend payable July 15 to all holders of fully paid up stock of record as of June 30. This is the second 2 per cent cash dividend by the company in the current year and is to be paid from the earnings of the company during the last three months.

Bassick-Alemite Co. has declared its regular quarterly dividend of 50 cents on the common stock, payable to stock of record June 20. Earnings of the consolidated company were three times dividend requirements in the first quarter.

Goodyear Tire & Rubber Co. has declared its regular quarterly dividend of $2 a share on the voting trust certificates for prior preferred stock, payable July 2 to holders of record June 15.

Mack Trucks, Inc., has declared its regular quarterly dividends of $1 a share on common and $1.75 each on the first and second preferred stocks, all payable July 2 to holders of record June 20.

Kelly-Springfield Tire Co. has declared its regular quarterly dividend of $1.50 a share on its 6 per cent preferred stock, payable July 2 to stock of record June 15.

Hupp Motor Car Co. has declared its regular quarterly dividend of 1¾ per cent on preferred stock, payable July 1 to stock of record June 20.

Reo Motor Car Co's earnings for 1923, based on current monthly earnings, are estimated at between $6,000,000 and $7,000,000.

Chandler Motor Car Co. has declared its regular quarterly dividend of $1.50, payable July 2 to stock of record June 20.

Suit Brought on Axle and Gear Order Ended

SPRINGFIELD, OHIO, June 11—Under the terms of a settlement approved in common pleas court covering a suit for $24,000, brought against the Kelly-Springfield Motor Truck Co. over a year ago by the Sheldon Axle & Spring Co. of Wilkes Barre, Pa., the defendant will use in its production 138 axles which had been built for it by the Pennsylvania concern. The axles had been held here pending the outcome of the suit.

A $5,500 claim for special gears ordered from the axle company was also allowed by the terms of the settlement.

BANK CREDITS

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

Although more favorable weather conditions stimulated general trade considerably last week, the quiet in general business continues. Production in most lines, however, shows little or no abatement.

Car loadings in the week ended May 26 again made a seasonal record, and were only 4510 cars under the maximum for any week.

Railroad earnings in April were the highest monthly total since the passage of the Transportation Act in 1920, allowance being made for seasonal variations.

The Department of Agriculture's forecast of the wheat crop, based upon June 1 condition, is 817,000,000 bushels. This compares with a harvest of 856,000,000 bushels last year. The estimate for winter wheat was below and that for spring wheat above what had generally been expected.

Cotton Mills Slow Down

Further curtailment of operations by cotton mills is reported, and the slowing down is now noticeable in the South, particularly in North Carolina, as well as in New England. Another evidence of slowing down in forward buying was the decline of 307,158 tons in the unfilled orders of the U. S. Steel Corp. in May.

The relaxation in the building industry has spread to other districts than New York and is especially marked in other Middle Atlantic States and in New England.

Wholesale prices showed a tendency toward stabilization last week. The Fisher copyrighted index remained at 160, as compared with a decline of 3 points in the preceding week.

Bills discounted by the Federal Reserve banks increased $3,926,000 in the week ended June 6, as compared with an increase of $31,000,000 in the preceding week, while purchases of acceptances in the open market declined $9,584,000. The circulation of Federal Reserve notes remained practically unchanged, and deposits increased $24,443,000.

Loans Further Reduced

Reporting member banks in the week ended May 29 showed a further reduction of $52,263,000 in loans and discounts. The reduction was almost entirely in commercial loans, as distinguished from loans secured by Government or corporate securities. The investment account remained practically unchanged—a decline of $32,617,000 in holdings of Government securities accompanies by a gain of $31,513,000 in other securities.

The ease in money rates was sustained last week. Quotations for maturities ranging from ninety days to four months remained at 4¾ to 5 per cent, with five and six months' paper quoted at 5¼ per cent.

Sales in India Feel Effect of High Duty

Transportation Development Retarded, Says Distributor of Hupp Car

DETROIT, June 12—An increase in import duty first to 20 and then to 30 per cent on motor cars and even higher levies made on tires, tubes and gasoline is holding back the development of motor transportation in India, declared John B. Pratt of T. R. Pratt, Ltd., Hupp distributor in Calcutta, who has been visiting the factory. Strenuous protest against the heavy duty has been made by the Motor Trades Association.

Inflation in India following the war was greater than in almost any country, he says, and as a result India has been one of the last to go back to a normal business basis. With continued progress, a larger market for automobiles is looked for in 1924, with still better business in 1925. The majority of surplus stocks, due to inflation, has been sold, Pratt states, and business houses are beginning to order new material.

Improved financial methods will mean far greater business for American car manufacturers in India, the potential market being enormous. Failure to take advantage of this market and of the export market generally was ascribed by Pratt to the enormous domestic market in the United States and to the difficulties that might be experienced in too great expansion.

American cars will make greater forward strides in all foreign countries, Pratt says, when the advantages of standardized production and parts replacement are thoroughly understood by the motoring public.

Ford Seeks to Register "Lincoln" in Australia

WASHINGTON, June 11—Word has been received here that the Lincoln Motor Co. of Detroit and the Lincoln Motor Co. of Australia are making a determined fight for the registration of a trademark embodying the name "Lincoln." It is understood that the Detroit company intends to push its Australian sales in a vigorous fashion, as the demand for high grade American cars is slowly increasing on the continent.

The applications were heard by the Deputy Registrar of Trade Marks, who decided that the Australian company was entitled to registration on the grounds that it had used the word "Lincoln" in connection with motor cars in Australia; that it was qualifying the trademark by the word "Australia"; that the American company had never used the word in respect of motor-cars for America or Australia, but had used it in the name "Lincoln Liberty Motors" for aircraft only, and that there had been "no prior user" by the American company.

Based on the contention that it had been "prior user" of the word and was entitled to the exclusive use of it, the American company has appealed to Chief Justice Sir William Irvine against the decision.

INDUSTRIAL NOTES

Electric Steel Co. of Chicago has changed its title to the Nugent Steel Castings Co., and W. J. Nugent, formerly with the American Steel Foundries and the Ohio Steel Foundry Co., has been elected vice-president and general manager. Other officers are: President, Charles Piese; treasurer, Prentiss L. Coonley; secretary, C. A. McDonald.

American Gas Accumulator Co. of Elizabeth, N. J., which makes traffic beacons and highway lighthouses, has opened a New York office at 100 East Forty-Second Street, in the new Pershing Square Building.

Wisconsin Registrations Show Nearly 30,000 Gain

MADISON, WIS., June 13—The number of automobiles in Wisconsin has increased nearly 30,000 over 1922, bringing the total number licensed in 1923 to an estimated 430,000, according to Alex J. Cobban, in charge of the automobile division of the Secretary of State's office.

Revenue from application of the State license fee is expected this year to amount to approximately $5,000,000, which is several hundred thousands of dollars more than last year. This license money goes for maintenance of the State trunk highway system, for maintenance of the highway department and for State aid to counties.

It is estimated by the automobile division that there is approximately one automobile to every six persons in Wisconsin.

South Carolina Registrations

COLUMBIA, S. C., June 13—More than 100,000 motor vehicles were registered in South Carolina the first five months of this year, according to the State highway department. The registration fees total $794,465. The registrations are far ahead of those of any years in the history of the department.

The registrations include 91,347 automobiles, 8244 trucks, 135 trailers, 396 motorcycles, 439 dealers' and 1145 transfers.

South African Tariff Increases Tire Duty

WASHINGTON, June 12—It is expected that all tire prices will be increased in South Africa in the near future as a result of the change in the customs duty. The former average duty per tire was 8 shillings, and under the new rating it is about 14 shillings.

Stocks of tires are large, and there has been a constant introduction of new makes selling at competitive prices.

Trade Associations Confused on Status

Different Interpretations Placed on Recent Decision Given in Armstrong Case

WASHINGTON, June 9—Confronted by a number of conflicting court decisions, the various Federal departments are in a quandary as to the Government's attitude toward trade associations.

The recent decision of the United State Supreme Court in the case of the Armstrong Bureau, made up of manufacturers of linseed oil, has been interpreted in different ways as to its bearing on trade associations. Reversing the decision of Judge George A. Carpenter of the District Court of the Northern District of Illinois, the Supreme Court held that the bureau was operating in violation of the Sherman law, that its declared purpose was "to submerge the competition that theretofore existed among the subscribers and substitute 'intelligent competition' or 'open competition,' to eliminate 'unintelligent selfishness' and establish '100 per cent confidence.'"

See Ban on Activities

The fact that legal minds interpret the decision differently would seem to uphold the opinion that the situation has been further confused. Those who contend that the air has been cleared take the position that the decision merely is a reaffirmation of the principle fixed in the hardwood case and that it has struck again at "open price" associations only. But others take another view and say that the decision puts a ban on many activities other than the exchange of price information, which "tend to suppress competition."

The decision has given added impetus to the contention of Secretary Hoover and other Government officials who always have encouraged what they consider to be legitimate trade associations and the empowering of some governmental agency to pass in advance upon trade associations.

Legislative Efforts Failed

Mr. Hoover recently went on record in favor of having the Sherman anti-trust law modified, in order to lift so-called undue restraint on trade association activities. Attempts made in Congress, however, to empower the Federal Trade Commission to pass upon trade associations and make recommendations as to their legality failed.

The trade associations originally on record in favor of such legislation became lukewarm and even quietly hostile to the legislation and this is attributed as one reason why further efforts were not made to enact it. The attitude of these particular trade associations, it is understood, grew out of the fact that they were strongly opposed to coming under the scrutiny of the commission.

Calendar

SHOWS

Sept. 1-7 — Chicago, National Transportation Exhibition, under the auspices of Motor Truck Industries, Coliseum and Annex.

Nov. 4-10 — New York, First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.

FOREIGN SHOWS

Oct. 4 - 14 — Paris, Passenger Cars, Bicycles, Motorcycles and Accessories, Grand Palais.

Oct. 15-20—London, Motorcycle Show, Olympia.

Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.

Nov. 1-15—Buenos Aires, Annual Automobile Exposition, under the direction of the Automovil Club Argentino.

Nov. 2-10—London, Automobile Show, Olympia.

Nov. 22-Dec. 1—London, Motor Transport Exhibition.

RACES

July 2 — Tours, French Grand Prix 500-mile race.

Sept. 3—Annual Pikes Peak Hill Climb.

Oct. 28—Barcelona, Spain, Grand Prix for vehicles of 1500 c.c.; Nov. 1, International Grand Prix for cycle cars of 1100—Nov. 4, International Grand Prix for two liter.

CONVENTIONS

June 26 - 27 — Detroit, Annual Convention of Automobile Body Builders Association.

Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of Farm Equipment Manufacturers, Hotel Statler.

Nov. 12-17 — Chicago, Annual Business Exhibit and Convention of the Automotive Equipment Association, Coliseum.

S. A. E. MEETINGS

June 19-23—Summer Meeting of the S. A. E.—Spring Lake, N. J.

Oct. 25-26—Production Meeting of the S. A. E.—Cleveland.

Jan. 1924—Annual Meeting of the S. A. E.—Detroit.

MEETINGS

June 25-July 1—Dixville Notch, N. H., Summer Meeting of the Automotive Equipment Association.

Sept. 19—Boston, Fall Meeting of the Motor and Accessory Manufacturers Association.

Texas and Arkansas Offer Good Outlook

CHICAGO, June 11—An unusually bright outlook for the automotive trade in Texas and Arkansas for the next few months is reported by Arthur R. Mogge of the merchandising department of the Automotive Equipment Association, who has just returned from a tour which took him into many cities of the two States.

A large cotton crop with the price continuing high is bringing promises of prosperity to the farmers in Texas. A favorable season has been highly beneficial to other crops, with the result that reports from all sections of the State were optimistic.

At Corpus Christi, Mogge met leading dealers from all parts of the State and they expressed complete confidence that sales of cars, trucks and accessories will continue good through the summer and fall. Texas is one of the States where the market for the open car is at its best, the mild climate permitting comfortable operation of such cars practically the year round.

Among the cities in Texas which Mogge visited were Greenville, Dallas, Corpus Christi, Waco, Austin, and Fort Worth. He also spoke at dealers' meetings in Little Rock and Fort Smith, Ark., and found dealers in these cities surprisingly optimistic as to the prospects for business this summer. Arkansas also is raising good crops, and the State generally is prosperous.

N. A. C. C. Appropriates $6,500 in Essay Contest

NEW YORK, June 11—The National Automobile Chamber of Commerce has appropriated $6,500, to be used as prize money in the third annual safety essay contest promoted by the Highway Education Board of Washington, bringing the N. A. C. C.'s contribution up to $12,000. To this is added $3,000 by the Highway Education Board.

It has been found that it will require about $8,500 to promote the contest, which is designed to arouse the children of the country to the need of caution when using the highways.

There will be 475 prizes for children of the grammar school age, the awards being distributed among the States according to their school population. Three first prizes will be offered—a gold watch and a trip to Washington for the children; a $500 cash prize for teachers and a trip to Washington. The last named prize will be awarded for the best essay on rural highway safety, the contest being conducted by the National Grange Master's office at Fredonia, N. Y.

Representing the N. A. C. C. is Edward S. Jordan, who has been chosen as the special representative of traffic and safety. Full information on conditions of the contest may be obtained from the Highway Education Board, Washington, D. C.

Stockholders of Dorris to Act on Merger June 14

ST. LOUIS, June 11—A meeting of the stockholders of the Dorris Motor Car Co. has been called for June 14, when the proposed merger with the Haynes Automobile Co. and Winton Co. will be acted upon. This course was decided at a recent meeting of the board of the Dorris company, attended by all the directors, with the exception of Parker H. Woods.

C. P. Holzderber, a representative of the Bankers' Issue Corp., New York City, made the proposal to merge the three companies into the Consolidated Motors Corp.

REO BRANCHES INCORPORATE

DETROIT, June 12—Reo Motor Co.'s branches at Detroit and Lansing have been incorporated as the Reo Michigan Sales, Inc., with a capital of $25,000, all of which has been paid in cash. The incorporation is in line with the company's policy of incorporating all its branches, there now being ten located at Los Angeles, Phoenix, Ariz.; San Francisco, New York, New Rochelle, N. Y.; Brooklyn, Newark, N. J.; Windsor, Ont., and the two Michigan branches.

Iowa Farmer Clears His Old Obligations

DAVENPORT, IOWA, June 11—Two factors in Iowa's financial status were reflected in automobile agencies' reports this week and explained in a measure the encouraging June sales trend which is a continuation of the unusual spring business.

The first one—notable primarily in dealers of the medium priced models—was the payment of the Iowa bonus. Thousands of checks for sums ranging from $100 to $350 have gone out to ex-service men who are utilizing the cash derived from them.

The second and a broader financial circumstance is shown in the report of Frank Warner, secretary of the Iowa Bankers' Association, in which it is stated that indebtedness of the State banks to the Federal Reserve and the War Finance Corp., which reached over $100,000,000, has been reduced in two and a half years to nearly $20,000,000. The source of the flow of prosperity which has hastened the liquidation has been the small-town bank, which means that the farmer has cleared his obligations, and is once more a prospective buyer.

The report, however, indicates that the liquidation has been supported by every class of earners in the State and that groups in every line are recovering fully from the depression of 1921 and establishing themselves upon a normal footing. The result has been that as conditions righted themselves dealers have felt a return in new car sales records and it has been a business enjoyed as heavily by the high priced car as by the medium or lower priced model.

POWERTOWN MEETING

ROCHESTER, N. Y., June 12—George H. Holmes, sales manager of the Powertown Tire Corp., announces that stockholders will hold a meeting at the plant in this city the third week in July for the purpose of becoming acquainted with each other and obtaining an inside view of tire construction.